American Gas Journal

VOLUME 134

Seventy-First Year

From January, 1931, to June, 1931

American Gas Journal, Inc.

Publishers

53 Park Place New York City

Vol. 134, No. 1 January, 1931 Price 25c

AMERICAN GAS JOURNAL

Established 1857 Pioneer of the Gas Industry

Manufactured and Natural Gas.

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3982
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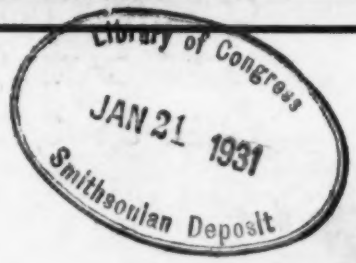

Milwaukee Gas Specialty Company recommends the use of Push-Button Ignition on gas burning appliances-- it insures 100% Safety.

Milwaukee Gas Specialty Co., Milwaukee

In Two Parts — Part One

1930

BECKER OVEN CAPACITY

DURING THE PAST YEAR, 754 BECKER TYPE BY-PRODUCT COKE OVENS WERE PLACED IN OPERATION OR UNDER CONSTRUCTION. THESE OVENS WILL HAVE AN AGGREGATE ANNUAL CARBONIZING CAPACITY OF OVER 5,948,000 TONS OF COAL.

Plant and Location	No. Ovens	Annual Coal Carbonizing Capacity Net Tons
BETHLEHEM STEEL COMPANY, JOHNSTOWN, PA.	77	570,000
BETHLEHEM STEEL COMPANY, SPARROWS POINT, MD.	61	353,000
COLORADO FUEL & IRON COMPANY, PUEBLO, COLO.	31	273,000
CONSOLIDATED GAS COMPANY, HUNTS POINT, N. Y.	37	320,000
CONSUMERS POWER COMPANY, JACKSON, MICHIGAN	11	35,000
DONNER HANNA COKE CORP., BUFFALO, N. Y.....	51	359,000
HUDSON VALLEY FUEL CORP., TROY, N. Y.	31	266,000
ILLINOIS STEEL COMPANY, GARY, IND.	138	1,230,000
JONES & LAUGHLIN STEEL CORP., WOODLAWN, PA...	81	852,000
NEW ENGLAND FUEL & TRANSP. CO., EVERETT, MASS.	149	1,117,000
PROVIDENCE GAS COMPANY, PROVIDENCE, R. I.	25	188,000
ROCHESTER GAS & ELECTRIC CORP., ROCHESTER, N. Y.	37	170,000
WEIRTON STEEL COMPANY, WEIRTON, W. VA.	25	215,000

KOPPERS

CONSTRUCTION COMPANY

CHICAGO PITTSBURGH NEW YORK

AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*

Manufactured and Natural Gas

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H. M. RILEY, *Editor*

R. S. MCBRIDE, *Consulting Editor*, Washington, D. C.

Vol. 134, No. 1 January, 1931 Whole Number 3685

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AMERICAN GAS JOURNAL, January, 1931, Vol. 134, No. 1 Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive, Editorial, and Business offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928, at the postoffice of East Stroudsburg, Pa., under the Act of March 3, 1879.

Subscriptions $2.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada $3.00; foreign $4.00. Single copies 25 cents.

GEORGE R. MACDONALD, *Advertising Rep.*
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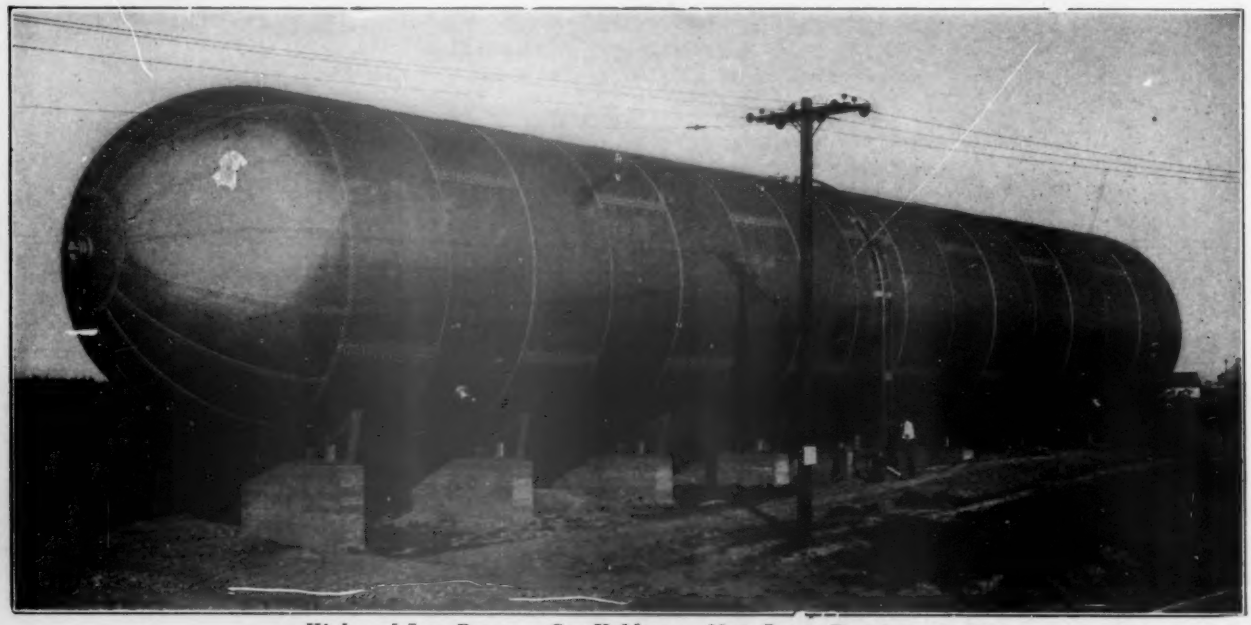

High and Low Pressure Gas Holders to Meet Every Requirement

We believe that the present time is most advantageous for the placing of contracts for either low or high pressure gas holders, due to the fact that the price of steel, entering into their construction is particularly favorable to the buyer, and shop fabrication can be performed during the winter months at a low cost, which will effect substantial savings.

We would appreciate an opportunity of discussing this matter with you.

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View of 30′ Diameter Semet-Solvay Welded Steel Purifier, New London, Conn.

NOTE the simple, convenient design, the smooth, rugged construction welded both inside and outside, the well-sloped deck and cover, the accessibility of the valves, the full depth hinged oxide doors and the high grade, efficient manifold construction.

SEMET-SOLVAY PURIFIERS are made round or rectangular, built at ground level or elevated, with bottom dumping, or side opening oxide doors.

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This is our New
MECHANICAL GRATE

Eliminates barring down and clinkering time—Saves Generator lining—Increases capacity of Set—Insures uniform and constant condition of fire—Provides even and uniform removal of Ash—Prevents clinker and blow holes.

For Large or Small Sets

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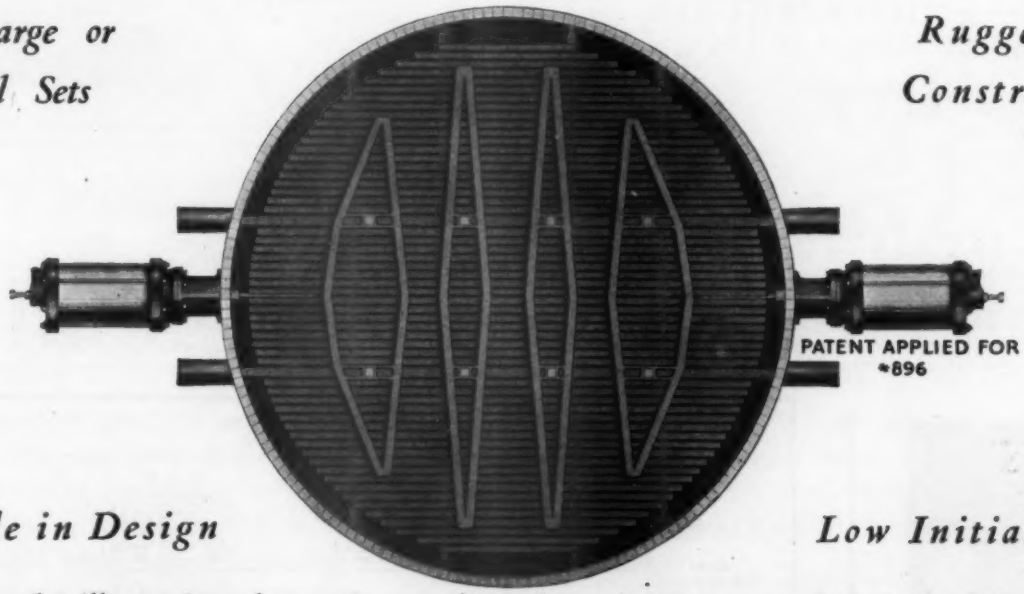

Simple in Design

Low Initial Cost

Note, in the illustration above, the peculiar shape of the drag bars. The tapering design of these drag bars produces a "plowing" effect and as the drag bars are moved over the surface of the grates in a reciprocating manner, the finer particles of ash and clinker are discharged through the self-cleaning grates, while the larger pieces of clinker which may have formed are crowded over the surface of the grates and discharged through the annular opening provided at the circumference of the same.

The two draw bars are connected at each end by a cross-head, which in turn engages the piston rods of the hydraulic cylinders. This hydraulic pressure is all the motive power necessary for operating the draw bars.

There are many other novel features of this New Mechanical Grate which we will be pleased to explain to you to your decided advantage. Write us.

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THE GAS MACHINERY COMPANY

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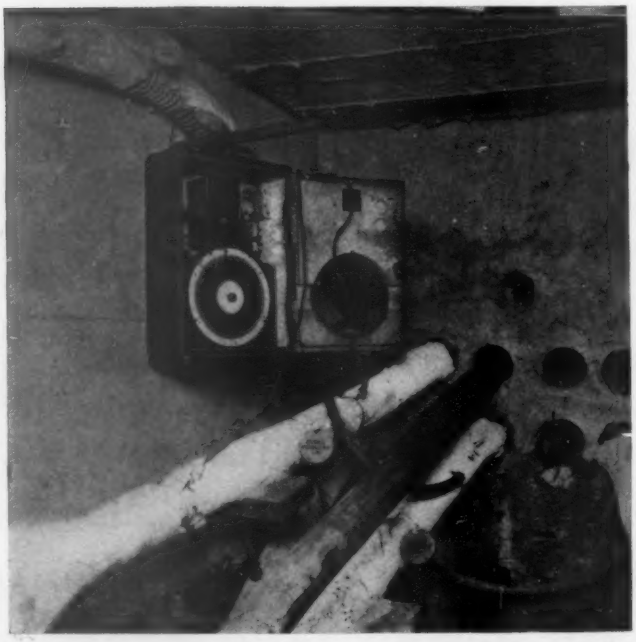
Electrolysis Survey!

Is First Step in Preventing Electrolytic Corrosion

Bristol's Recording Milli-Voltmeters Provide Positive Means of Determining Points in GAS DISTRIBUTION SYSTEM Where Stray Currents Are Flowing.



The above photo shows Bristol's Recording Milli-Voltmeter being used for Survey work by a New York Utilities Company.

GAS mains often deteriorate more or less rapidly at certain points. Check-ups usually show that these structures are carrying stray currents which leave the structures at the points of maximum corrosion. These currents generally flow from electric railway tracks to the underground structures which act as conductors. At high resistance joints or low resistance ground the currents pass back to the railway system, ground, or to the other structures.

The points at which currents leave structures are considered positive with respect to points these strays flow to. In order to determine the amount of current flowing through underground structures, the corrosion resulting therefrom, and possible remedial steps, electrolysis surveys should be periodically made. Such surveys essentially consist of:

Measuring potential differences between adjacent structures.

Measuring potential differences between points in the same structure.

Measuring currents flowing in a given structure.

Physical examination of the underground structure.

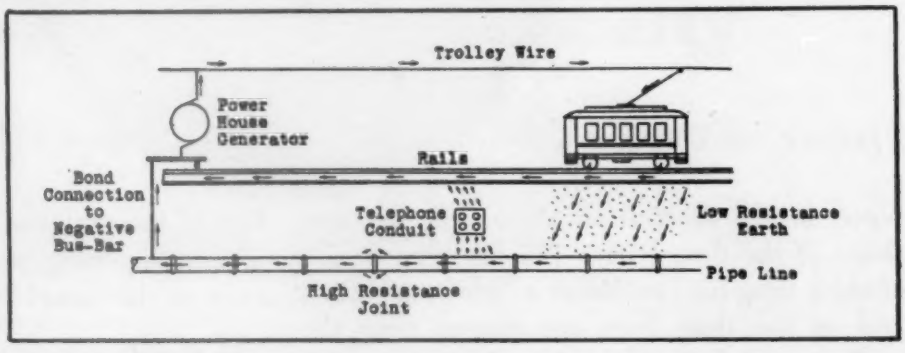
For the electrical measurements involved, Bristol's Portable Recording Milli-voltmeters are ideally suited and have long been the standard with Telephone, Gas, Railway, Electric and Water Companies and leading electrolysis engineers. They give continuous permanent records of conditions in a most convenient form for study and analysis.

For more detailed information, prices, etc., write The Bristol Company, Waterbury, Conn., or to nearest Bristol's Branch Office. Field Engineering Service without obligation.

Model 514

Above is shown Bristol's Portable Recording Milli-voltmeter recommended for Survey work. Operating mechanism is securely mounted in rugged wooden protection case, which is equipped with leather handle for carrying. (Also furnished in Portable Moisture-Proof Metal Case. Model 524). Two-speed clock (24-hour, 6-hour rotation) is available. The 8-inch chart is designed to permit recording any of the following ranges:

500-0-500	Millivolts
5-0-5	Millivolts
10-0-10	"
50-0-50	"
100-0-100	"
500-0-500	"
1-0-1	Volts
10-0-10	"
150-0-150	"



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Instruments *for* Indicating Recording Controlling

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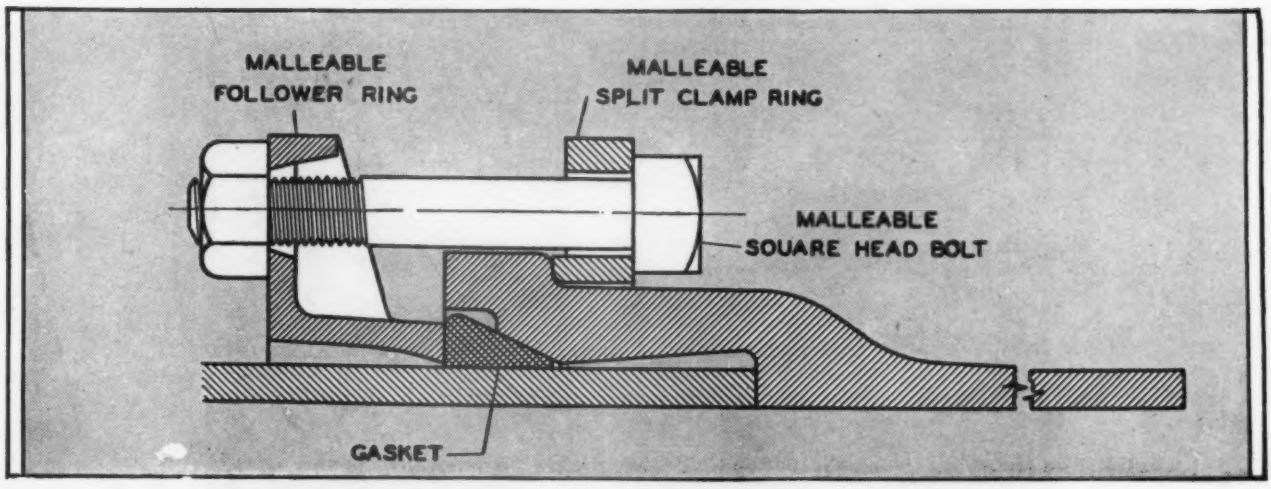

allows for greater deflection

It is remarkable, the amount of deflection which the improved Anthony Joint allows. This is due to the unique bell design as shown in the above illustration. You will notice that the gasket, while being held securely in place by the follower ring, functions as a fulcrum, allowing the spigot an unusual amount of play within the bell chamber.

Over the length of several pipes, this play or freedom results in a surprising amount of deflection. It permits a line of Anthony Joint pipe to be laid in steep or sharp curving trenches without the use of special bends.

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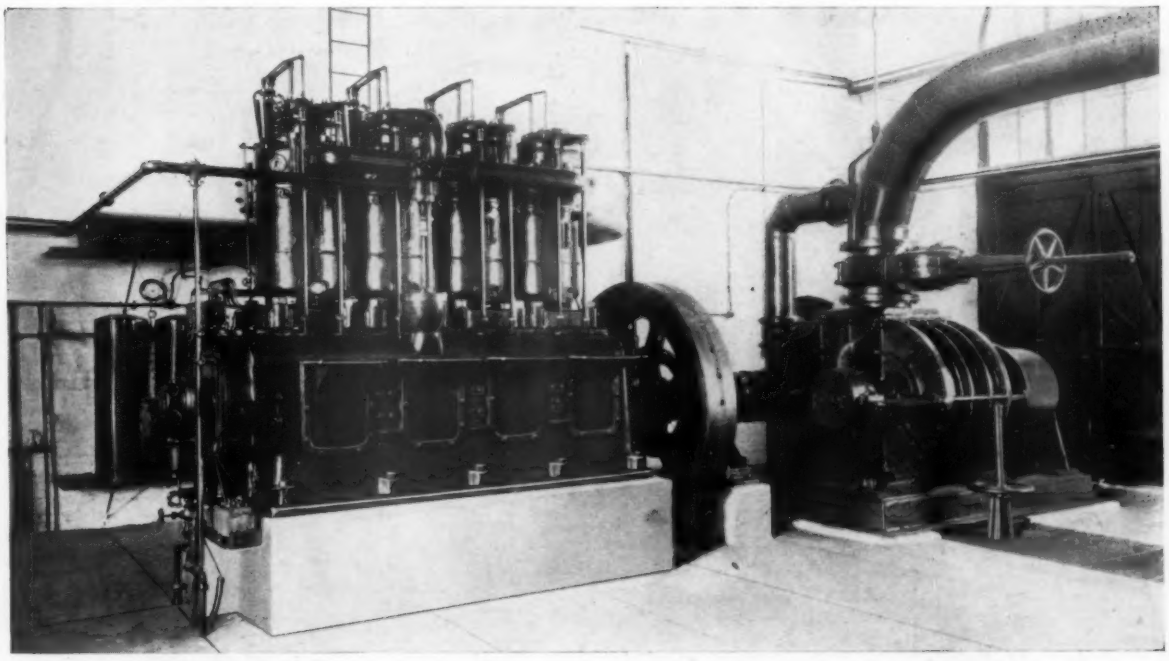

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handling 466,000 c. f. h. at 7 pounds

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The pump operates at 300 r.p.m., handling gas from atmospheric suction to a maximum of 7 pounds discharge. It is direct-coupled to a Cooper-Bessemer four-cylinder gas engine running at variable speeds on a high hydrogen content fuel gas.

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Even the slight shift of the center of gravity of the pen arm and connections, as the pen moves throughout the range of the chart, is counter-balanced.

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SINCE 1915, when it was first installed on a natural gas line, the Westcott Orifice Meter has won dominant recognition in the natural gas, manufactured gas, natural gasoline and petroleum industries. Today it is extensively used as the standard measuring instrument, not only for gases, but for steam and many liquids. It is backed by extensive Research in Field and Laboratory.

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And through fifteen years of dependable service the Westcott has proved itself worthy of a world-wide trust. Its correct and up-to-date design, the exact construction of orifices and differential elements, the uniform excellence of recording mechanisms—all together have endowed this meter with a degree of accuracy above and beyond the most exacting requirements of orifice metering today. Write also for information on Rate Volume Controllers, Indicating Flow Meters, Liquid Level Recorders and similar equipment.

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THE DEVELOPMENT AND UTILIZATION
OF LIQUEFIED PETROLEUM GASES
DURING 1930 ' ' ' TO
ALL OF OUR FRIENDS A
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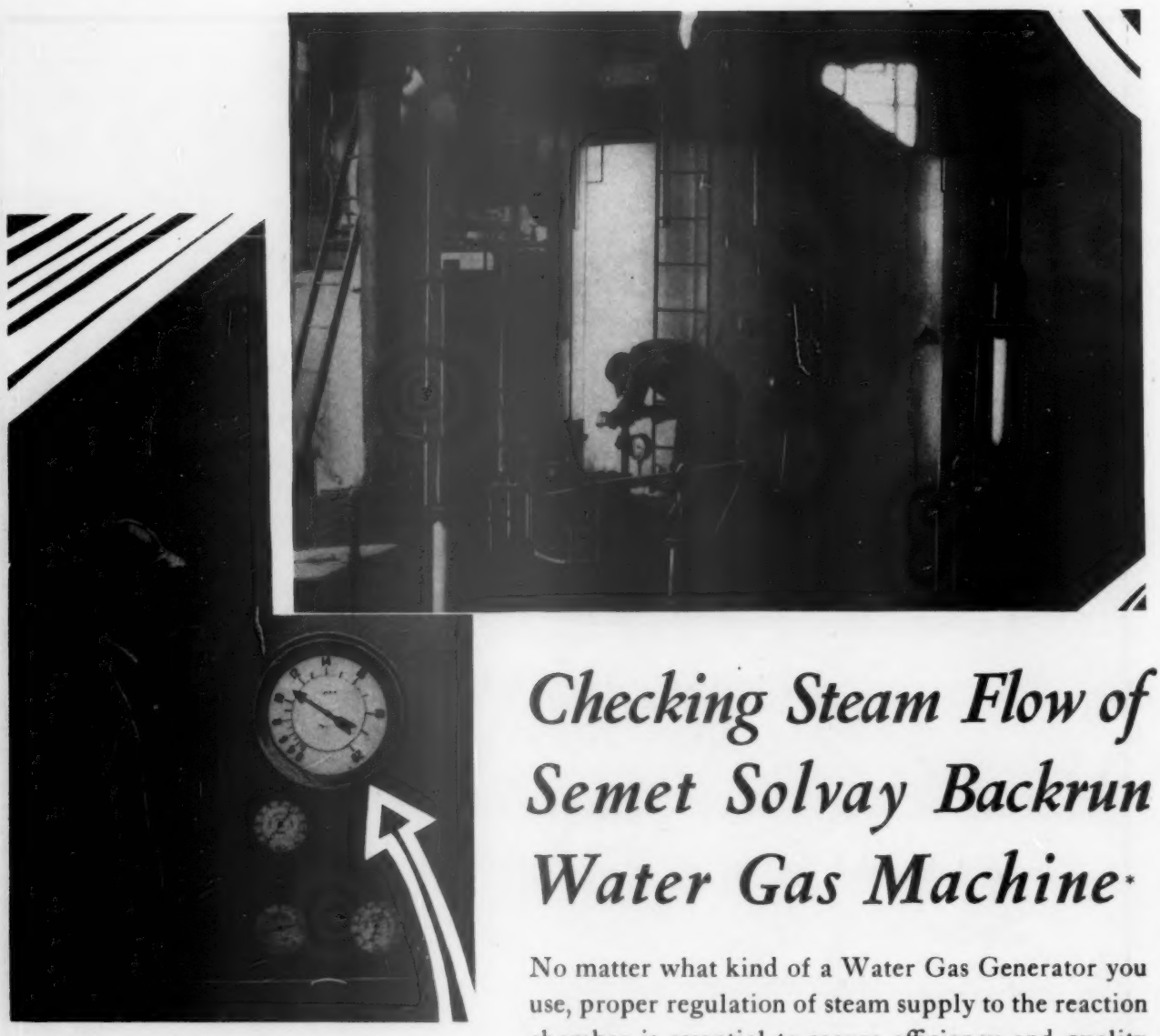
Gas Manufacturing Division

« PHILFUELS COMPANY »

(Subsidiary of Phillips Petroleum Company)

7-101 GENERAL MOTORS BLDG. DETROIT, MICHIGAN



* The name of the customer using the above illustrated equipment will be supplied on request.

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No matter what kind of a Water Gas Generator you use, proper regulation of steam supply to the reaction chamber is essential to secure efficiency and quality in output.

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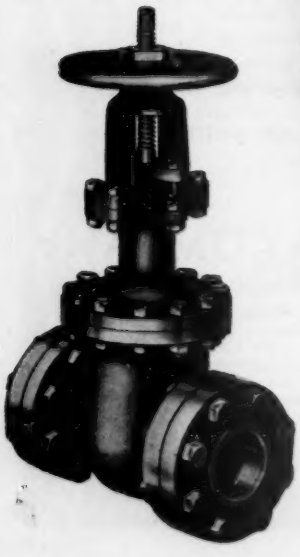
At any time we'll be glad to send you complete information.



Darling Outside Screw and Yoke Semi Steel Flanged End Gate Valve, with Companion Flanges Bolted On. Dar-a-loy Trimmed.

DARLING GATE VALVES

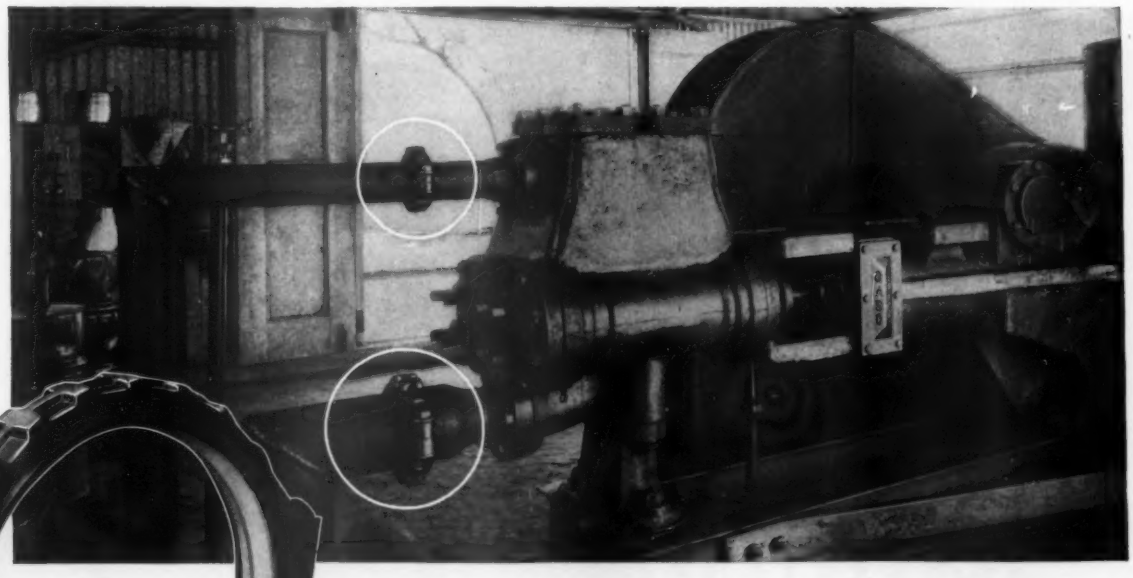
Darling Valve & Manufacturing Co.

Williamsport, Pa.

New York Los Angeles Oklahoma City Houston

Darval Semi-Steel Gate Valve Dar-a-loy trimmed —for natural Gas pipe lines and compressor stations.

"For every joint on the line"



Victaulic pipe couplings absorb vibration . . .

On the suction and discharge lines of this Prairie Pipe Line Company motor driven pump, Victaulic Pipe couplings act as shock absorbers. Why weaken your connections, by even normal vibration, when Victaulics relieve the strain and also allow for expansion and contraction?

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FLEXIBLE LEAK-PROOF

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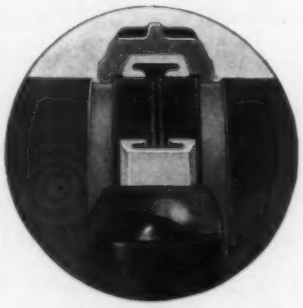

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26 Broadway New York Name .....

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FOR OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

Cast Iron Gas Mains laid in 1840 still serve the City of Memphis

Ninety-one years ago, the City of Memphis, Tennessee, laid its first cast iron gas mains. Today, a number of those self-same mains are still giving satisfactory service. Of course, many of the original cast iron pipes have been removed from time to time as the demand outgrew their capacity. Some were taken out due to re-routing and to street construction. But, in certain sections of Memphis, you will find many of the original cast iron gas mains still serving faithfully. Other cities can point to cast iron gas lines with even longer records of service. In Philadelphia, in Boston and in Baltimore, cast iron gas mains which were laid prior to the year 1837 are still in daily use.

. . . no wonder engineers Today specify modern *Cast Iron Gas Mains* for modern conditions

Yes, they made good cast iron pipe back in 1840.

Surely, when those old-time cast iron gas mains are making unequalled service records, it is not to be wondered that engineers are today specifying *modern* cast iron pipe for the gas mains of our cities.

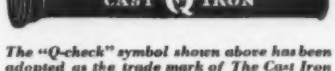
The Cast Iron Pipe of today is even better than the pipe laid years ago. Today, laboratory control and time-tested methods assure a high uniform quality not thought of in the Cast Iron Pipe of three generations ago. Present day knowledge of metallurgy and improved methods of manufacturing pipe have resulted in an improved product. And, new designs in joints and fittings have kept Cast Iron Pipe in step with the advance of the gas industry.

Engineers, contractors and city officials desiring information on the use of cast iron pipe for gas, water, sewers, road culverts or for industrial needs, are invited to write to Thomas F. Wolfe, Research Engineer, The Cast Iron Pipe Research Association, 309 Peoples Gas Building, Chicago, Ill.

[*Efficient mechanical joints for cast iron gas mains are now in use and obtainable for high-pressure gas distribution.*]

Cast iron pipe bearing the "Q-check" trade mark is obtainable from the following leading pipe founders: Alabama Pipe Company, Anniston, Ala.; American Cast Iron Pipe Company, Birmingham, Ala.; James B. Clow & Sons, 219 N. Talman Avenue, Chicago, Ill.; Donaldson Iron Company, Emaus, Pa.; Glamorgan Pipe and Foundry Company, Lynchburg, Va.; Lynchburg Foundry Company, Lynchburg, Va.; National Cast Iron Pipe Company, Birmingham, Ala.; United States Pipe and Foundry Company, Burlington, N. J.; Warren Foundry and Pipe Company, 11 Broadway, New York.

Reg. Trade Mark



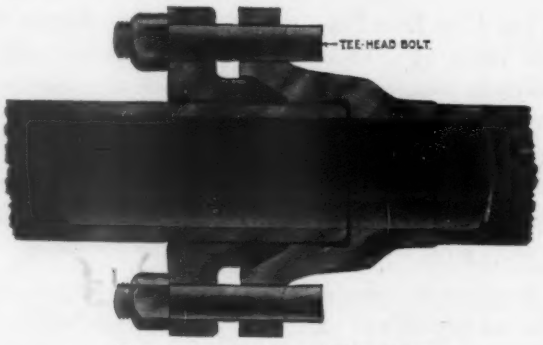
The "Q-check" symbol shown above has been adopted as the trade mark of The Cast Iron Pipe Research Association.

CAST IRON PIPE

DOUBLEX SIMPLEX CAST IRON PIPE

FOR HIGH and low pressure gas, oil fields and refineries, filtration plants, hot gases, liquors, acids, and industrial water supplies, we have perfected "Doublex Simplex" Cast Iron Pipe. It is a high-pressure pipe made by the Mono-Cast centrifugal method with a bottle-tight, flexible, gland-packed joint similar to a stuffing box. The friction grip of a gasket against the surfaces of the pipe creates a tight joint against separation and leakage even at extreme high pressures. The size and bulk of the gasket provides for unusual joint deflection and ample allowance for expansion and contraction. "Doublex Simplex" pipe can be laid quickly, economically. No bell holes; a common laborer can lay it with only one tool—a ratchet wrench. For full details, write "Acipco" office nearest you.

Installing Doublex Simplex Pipe in gas distribution system. On account of the flexibility of the joint and its ability to stay tight with repeated deflections, Doublex Simplex Pipe can be connected on top and "snaked" into the trench.



Cross-section, Doublex Simplex Joint

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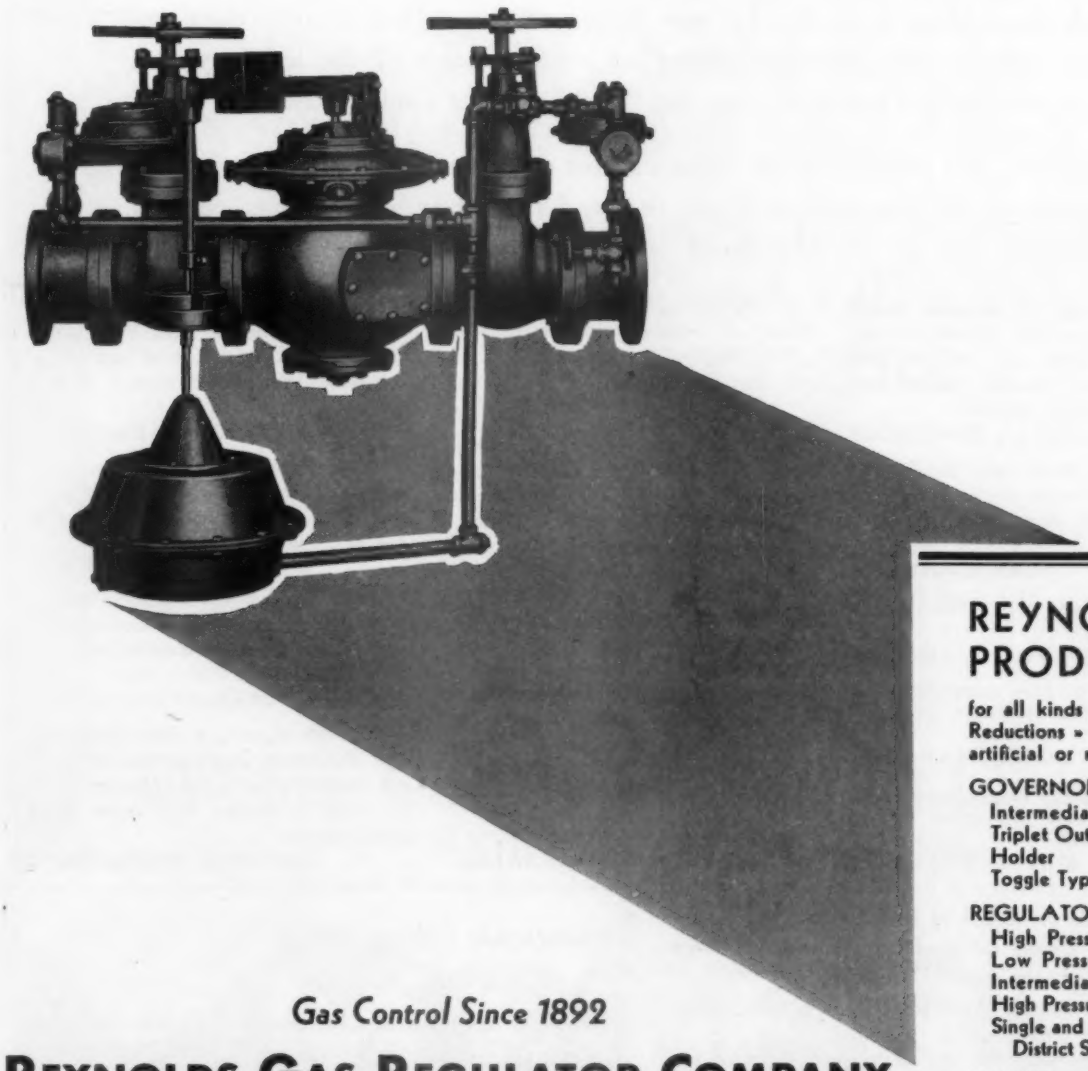

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Since its inception nine years ago, the American Gas Catalog and Handbook has grown in importance and value to every gas man everywhere.

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Could not get along without this Handbook.

DISTRICT MANAGER.

We refer to this constantly. Is very valuable reference book for any library.

LOCAL MANAGER.

Surely it is the best source of information that has come to my desk in years.

METER FOREMAN.

A very useful and well arranged book of information helpful to those engaged in various phases of the gas business.

VICE PRESIDENT.

The Handbook is very complete and my copy is referred to frequently.

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I find this one of the finest prepared handbooks which I have seen and is of particular value because it combines in a convenient manner a list of manufacturers in addition to the excellent selection of tables which are so often used by a gas engineer.

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Very useful as usual.

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MANAGER.

AMERICAN GAS JOURNAL

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UNEXCELLED

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Insure Longer Life and Less Repairs

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For General Use in Tin Meters

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Dresser Couplings are fast becoming standard equipment for modern manufactured gas lines. Speedy to install. Strong, flexible, durable. *permanently tight* under all pressures and movements. Maintenance nil.

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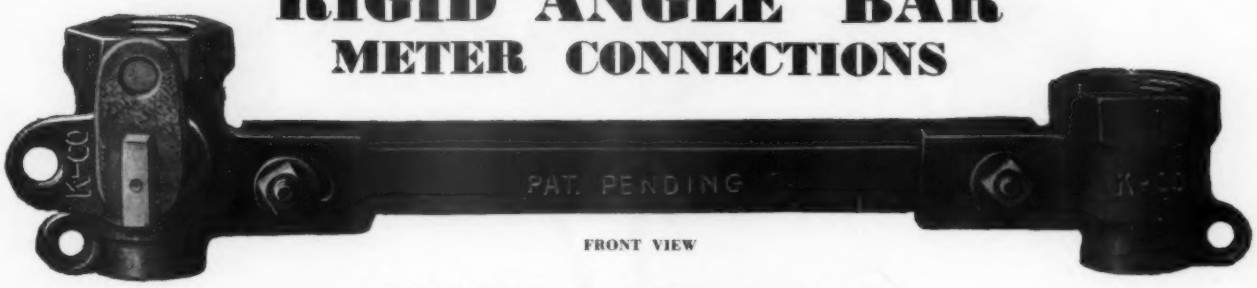
RIGID ANGLE BAR METER CONNECTIONS



FRONT VIEW

With Built-In Lock Wing Stop Cock

How do you install your meters?

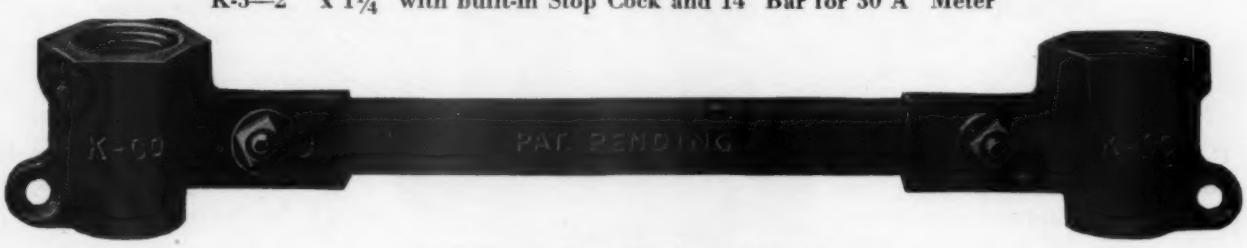
The modern way is to use Meter Connections for the Meter tie-up. This method eliminates extra fittings, provides support for the meter and makes a first-class installation job.

This adjustable three-piece connection does not require unions, and the stiff angle bar gives rigidity with neat appearance. It has been adopted by some of the largest gas companies and is being used on all sizes of meter installations.

REAR VIEW

The various sizes and styles of Connections and Meters for same are as follows:

K-0— ¾ x ½″ with built-in Stop Cock and 9″ Bar for 5 A Meter
K-1—1 x ½″ with built-in Stop Cock and 9″ Bar for 5 A Meter
K-2—1 x ¾″ with built-in Stop Cock and 10″ Bar for 10 LT Meter
K-3—1¼ x ¾″ with built-in Stop Cock and 10″ Bar for 10 A Meter
K-4—1¼ x 1 ″ with built-in Stop Cock and 12″ Bar for 20 LT Meter
K-5—2 x 1¼″ with built-in Stop Cock and 14″ Bar for 30 A Meter



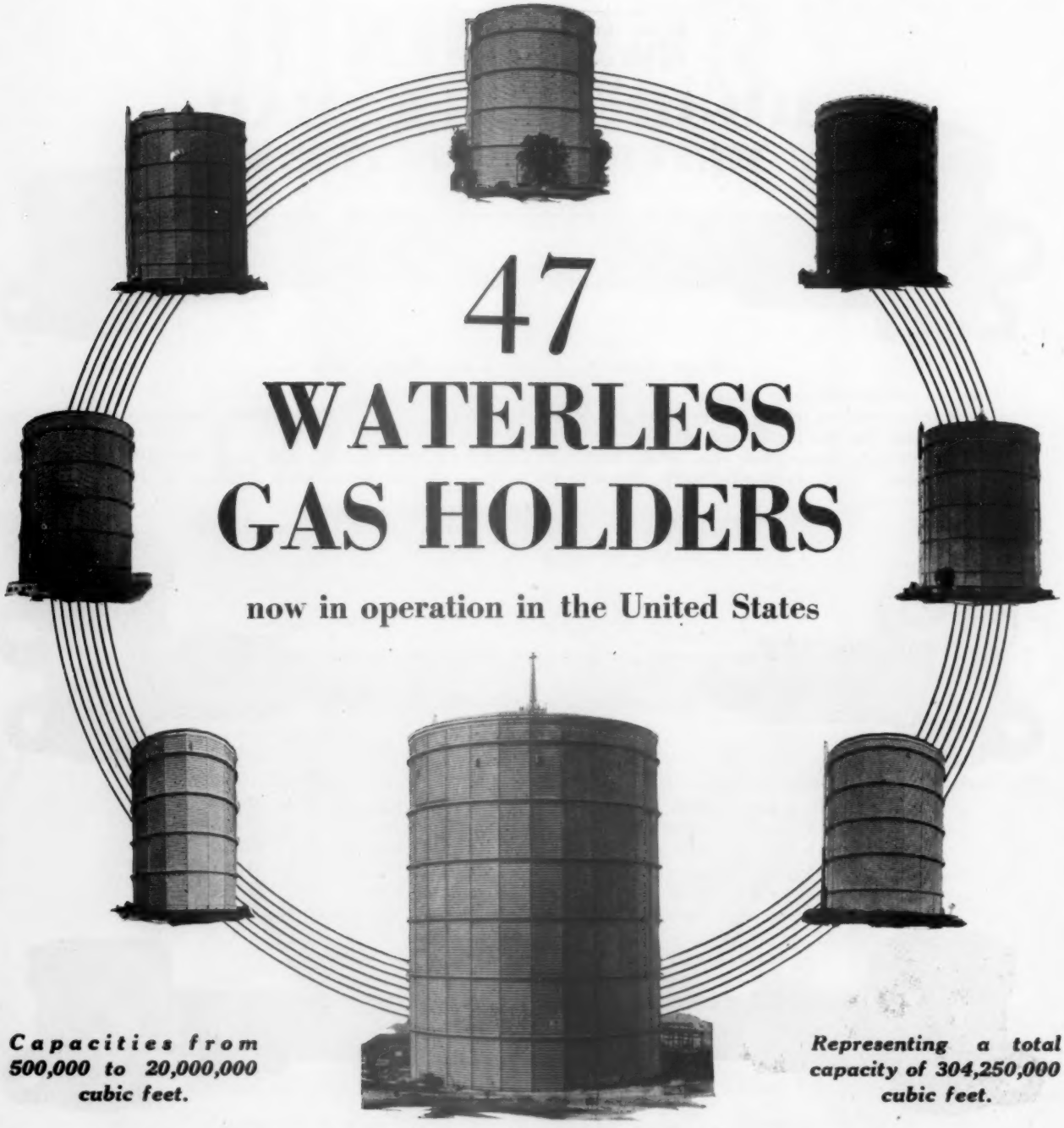
Without Built-In Stop Cock

The various sizes and styles of Connections and Meters for same are as follows:

L-0— ¾ x ½″ Meter Connection with 9″ Bar for 5 A Meter
L-1—1 x ½″ Meter Connection with 9″ Bar for 5 A Meter
L-2—1 x ¾″ Meter Connection with 10″ Bar for 10 LT Meter
L-3—1¼ x ¾″ Meter Connection with 10″ Bar for 10 A Meter
L-4—1¼ x 1 ″ Meter Connection with 12″ Bar for 20 LT Meter
L-5—2 x 1¼″ Meter Connection with 14″ Bar for 30 A Meter

KITSON COMPANY

PHILADELPHIA



47 WATERLESS GAS HOLDERS

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Capacities from 500,000 to 20,000,000 cubic feet.

Representing a total capacity of 304,250,000 cubic feet.

A signal advance in gas storage, the patented waterless gas holder as designed and built exclusively in the United States by The Bartlett Hayward Company has many advantages.

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AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Manufactured and Natural Gas

HENRY M. RILEY, *Editor*

What's Ahead?

THE GAS INDUSTRY at the present time is different from most business undertakings in that it has no wounds to tie up and no bloody head to bandage. With full cognizance of its strength and ability to carry on, it lays its plans to widen its service to the public with a confidence that augurs well for ultimate success.

Although complete official figures are not extant relative to the gas output and attendant data for the year 1930, it can be stated with assurance that no over-all retrogression has taken place. Owing to the fact that the past few years have seen an enormous increase in the output of gas for industrial uses, it was evident that the business slump of 1930 would exert its influence on this phase of utilization. Despite any losses in this direction however, the domestic and househeating increases have pulled us up to previous output levels, if indeed we have not gone a trifle ahead. Such a status is remarkable in view of general business conditions.

Much development of prime importance will assuredly take place during the present year and in addition, there would seem to exist certain problems which are worthy of serious study and solution.

Perhaps the item of most pressing interest is that having to do with the continued expansion of the natural gas end of our industry. Whether 1931 will see such activity reaching its crest and thence slackening its rate of increase is a moot question. Nevertheless, its introduction into manufactured gas communities, particularly where it will entirely supplant the manufactured product, calls for economic and engineering study of an extremely high order. What with the anticipated increase in natural gas available for use, due to the finding of additional sources as well as the savings that conservation will produce, we will have at hand a truly tremendous quantity of thermal energy. Notwithstanding this great supply it still costs a definite amount to transmit a given volume of natural gas a certain distance and the gas itself will fetch a relatively stable price at the well. Hence it is fairly easy to predetermine the cost per thousand of natural gas at the city gates where manufactured gas is being distributed.

Owing to the high heat value of natural gas an immediate reduction in cubic feet consumption must be anticipated when manufactured gas is being supplanted. This, of course, calls for intensified selling to get househeating and industrial customers to make up any deficit and obtain decreases. From the standpoint of industrial gas output, it must be borne in mind that it is not so easy to induce large manufacturing concerns to move their plants long distances to points where natural gas fuel can be obtained at attractive prices. The proximiy to raw markets, shipping facilities, location of ultimate customers and many other factors are what influence such relocations of factories.

Accordingly, manufactured gas companies should not rush pell-mell into a change over but should act only after all the engineering and economic factors have been carefully weighed. This method of approach will guarantee the best benefits to

the natural as well as the manufactured ends of the industry in the long run.

Two lines of investigation which are now under way offer promise of solving two problems of pressing moment. We refer first to the experimental work that is being done by the government in endeavoring to convert, on a commercial scale, large volumes of natural gas into chemical products. Success in such an undertaking will eventually use much of any surplus of natural gas that might obtain. The second of the problems is concerned with the bringing up of the output curve during the summer months and the work American Gas Association will do this year by way of keeping tab on actual house-cooling installations, will doubtless point the way to early annual load factor improvement.

By-product petroleum gases will unquestionably be sold in greatly increased quantities during 1931 and for a number of years after. This form of thermal energy is being produced in large quantities and will

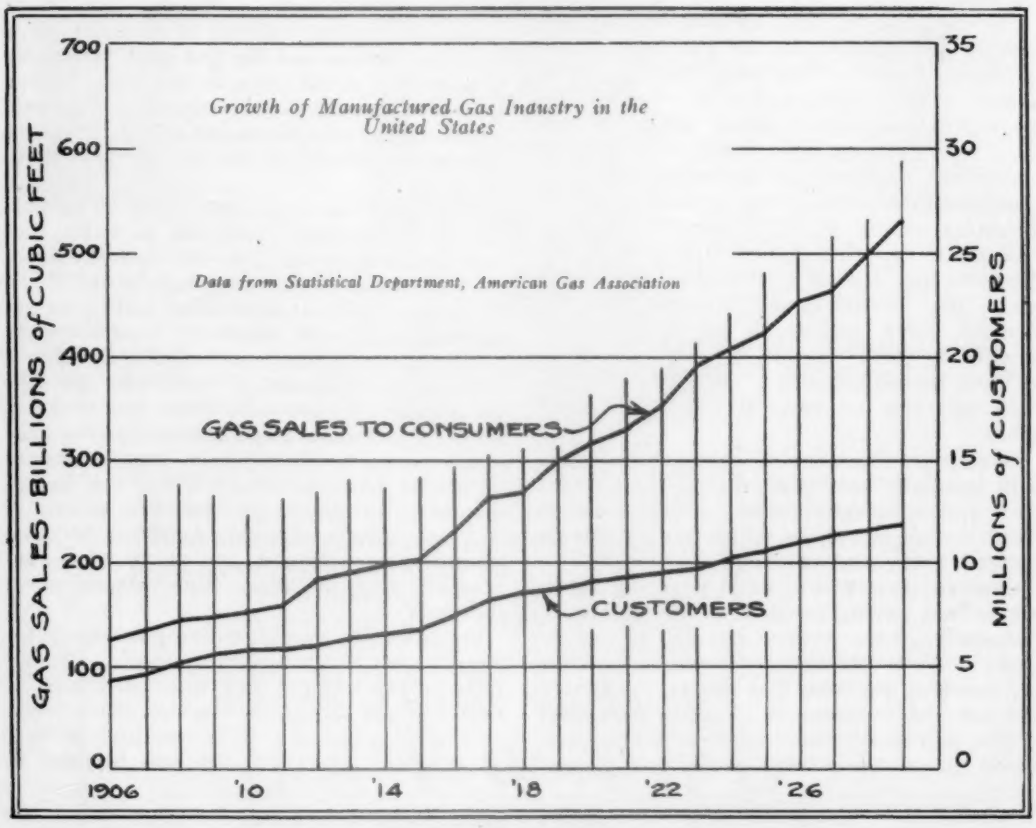
The gas industry has demonstrated its stability in 1930. It has proven that it can meet the new problems of the future as they may arise.

Despite recession in general business, the gas business has held its own and, speaking broadly, has shown growth and development. To some extent, this is due to the remarkable and rapid expansion in natural gas operations.

Another very important factor is the intensified effort in the sales activities of the manufactured gas industry in the placing of gas appliances for use in the home.

New England provides a very good illustration of this accomplishment. Gas sales for industrial purposes showed a marked decline, yet the total gas sales showed a normal increase for the year due to the sale of gas for house heating and other domestic purposes.

Business men and economists predict an early revival of business. The gas industry faces the future with confidence, feeling sure, by the record it has earned, that it will continue a leading factor in community development.—Clifford E. Paige, President American Gas Association.

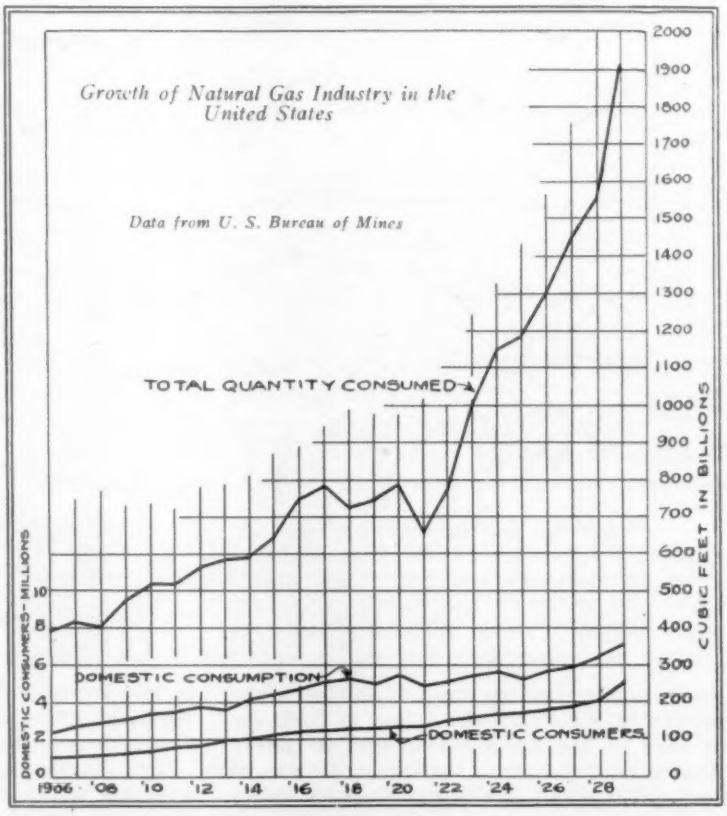


be sold. Consequently, there should be close co-operation between the gas industry as a whole and the producers of these gases so that their distribution will be administered to the best interests of all concerned.

Since it is freely predicted that home and similar building construction will show material advances over 1930 the gas industry should prepare to "cash in" on this activity. It should press the matter of home insulation so that house-heating by gas will be facilitated. The gas industry should even study the proper sort of home from the standpoint of best over-all gas utilization. We refer to the small type of suburban home that contains two bed rooms and a combination living and dining room. This type would seem to well loan itself to the all-gas-home idea and in addition, would seem to fill the want demanded by the small successful family just starting to get ahead and elderly couples whose children have left the family circle and who loathe going into an apartment for the rest of their days.

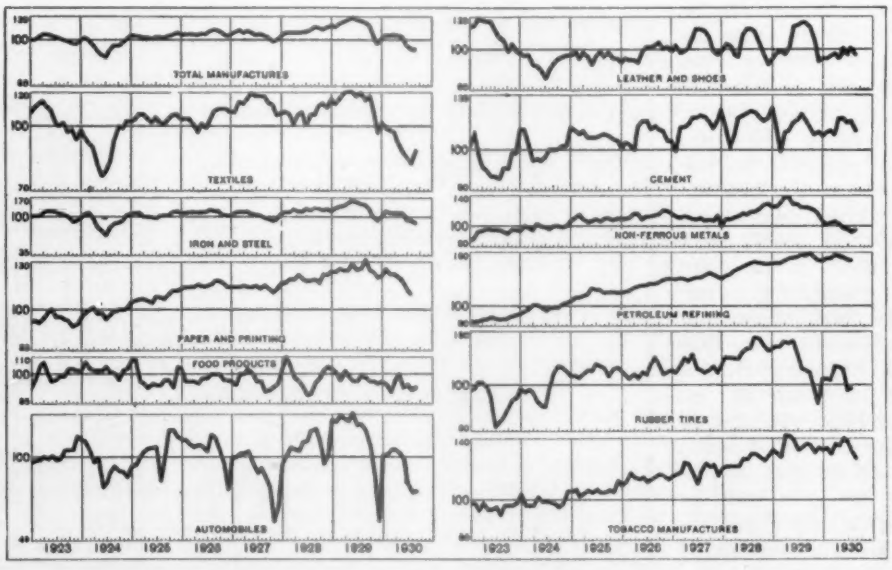
Home Service should be able to do some truly fine work this year. This is based largely on the results of a recent investigation by a prominent eastern realty organization which disclosed that the trend, particularly in apartment houses, is away from the kitchenette and toward the full-sized kitchen. This condition would seem to indicate that the kitchen in the home is also more than holding its own.

We can safely count on improved methods and equipment for gas manufacture, as well as marked-advances in pipe line and distribution construction, during 1931. Appliance design will also undoubtedly show worthwhile strides. In this connection we urge greater attention to safety devices for domestic appliances. The best engineering



The gas industry is now thoroughly alive to the vital necessity of regaining ground that has been lost in the consumption of gas in the home. 1931 should witness newer and better methods of stimulating good, old-fashioned home cooking in highly insulated and automatically-controlled gas ranges, increased efforts to drive home to young and old the healthful and labor-saving benefits of hot water, and especially the luxury and economy of the gas furnace. On the horizon seems to be the dawn of gas usage for air conditioning and cooling in the home—a twin brother of gas heating, which would help to counterbalance the latter's heavy winter load.

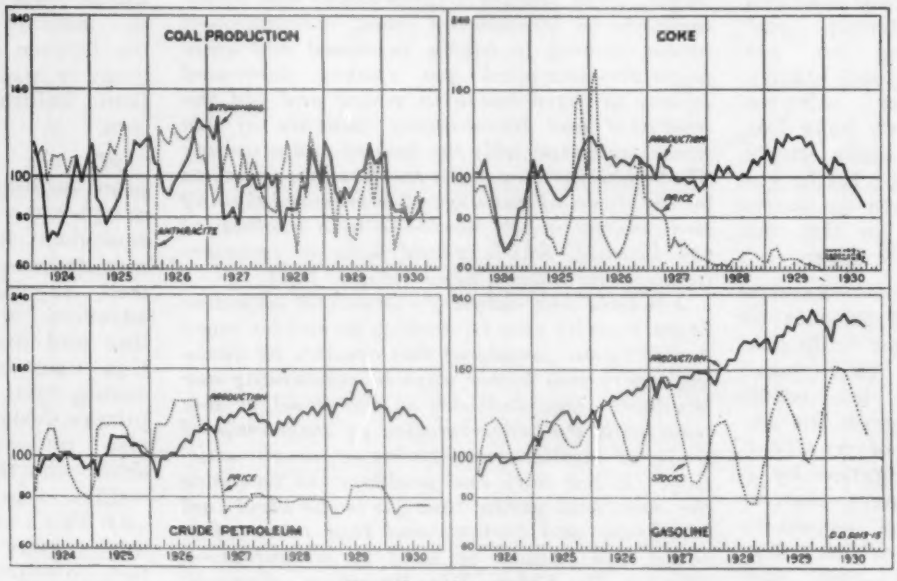
I believe our industry's principal objective in the coming year is, making its service more useful to the people of this country by devising newer and better ways of consuming our product. Our industry is not beset at this time with the uncertainties of international trade or swollen inventories or overproduction. It has only one problem: to convince the American public that gas is the ideal fuel for home and factory and that more of it could and should be used to advantage.—Charles M. Cohn, Vice-President, Consolidated Gas Electric Light and Power Company of Baltimore.



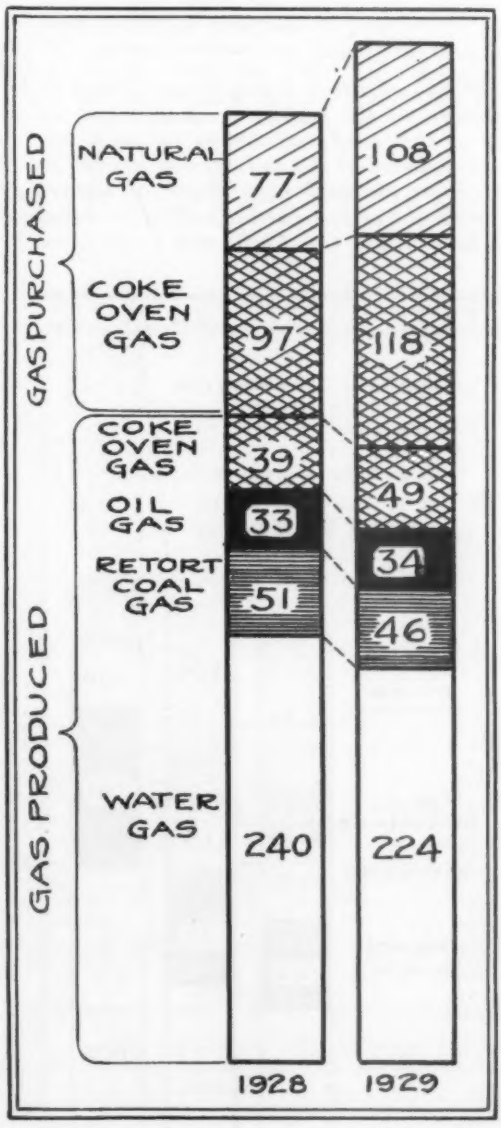
Manufacturing Production of some major industries which, in some cases, use relatively large volumes of Industrial Gas.
(Relative numbers, monthly average 1923-1925, taken as 100, adjusted for seasonal variations)
Data from U. S. Dept. of Commerce

brains in the country have developed these devices to make gas the safest of fuels for all uses in the home. The cost of safety devices adds but little to the final cost of the appliance and acts as an insurance policy for both the customer and the company. It is understood that the National Board of Fire Underwriters hold that the average fire insurance policy does not cover damage resulting from explosions of househeating or hot water boilers. In many cases in the past, the gas company has had to pay the damages resulting from such explosions.

The increasing success of the gas utility business warrants that many college graduates will seek employment therein. Accordingly, we can depend on receiving a continued supply of the best brain power for the solution of our future problems. In addition, expanding educational facilities,



THE FUEL INDUSTRIES
(Relative numbers, monthly average 1923-1925, taken as 100)
Data from U. S. Dept. of Commerce

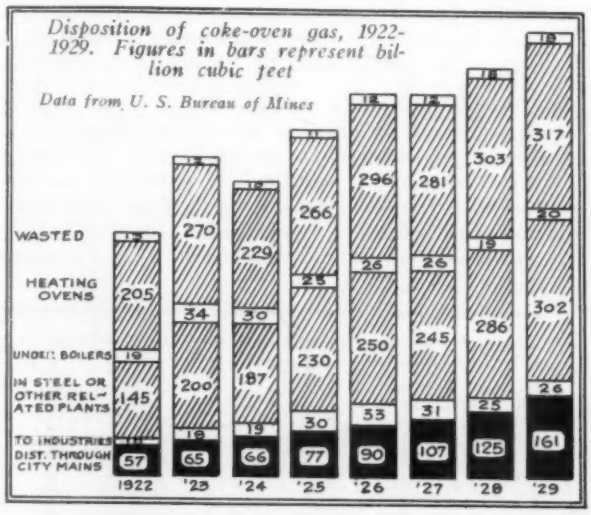


Manufactured Gas Industry in the United States

Gas Produced and Purchased by the Industry for Distribution to Consumers

Unit: Billion Cubic Feet

Data from Statistical Department, American Gas Association



Disposition of coke-oven gas, 1922-1929. Figures in bars represent billion cubic feet

Data from U. S. Bureau of Mines

such as are being offered through American Gas Association, will enable ambitious employees to advance with rapidity.

The gas industry as a whole faces 1931 rather like a collection of folks who are about to be admitted to an overflowing banquet. When the doors are opened let us proceed to tackle the viands with the decorous utensils of engineering and economic horse-sense, rather than rushing in and overturning the table in an effort to beat the other fellow in a gluttonous and wasteful gorging match.

Below—Building Forecast for 1931. This tabulation, reproduced by courtesy of National Trade Journals, Inc., should hold much promise for the Gas Industry

COMPARISON BETWEEN ACTUAL NEW BUILDING CONSTRUCTION IN 1930 AND FORECAST FOR 1931 IN TWENTY BUILDING TYPES

This comparison indicates only projects which were constructed from architects' plans. The figures for 1930 do not include engineering or other projects where architects' services were not employed. This particularly applies to the field of dwellings under $10,000 and to the industrial field.

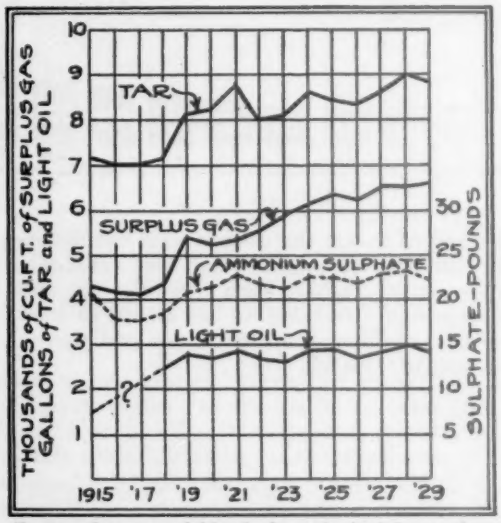
BUILDING TYPES	RECORDED* CONSTRUCTION	ESTIMATED UNRECORDED CONSTRUCTION	TOTAL CONSTRUCTION 1930	1931 FORECAST
Automotive	$86,984,700	$17,396,940	$104,381,640	$113,098,500
Banks	59,200,800	5,920,080	65,120,880	63,189,200
Apartments	308,042,700	77,010,675	385,053,375	311,548,800
Apartment Hotels	104,300,000	12,516,000	116,816,000	126,731,000
Clubs, Fraternal, etc.	44,877,800	13,463,340	58,341,140	84,939,000
Community & Memorial	35,856,200	3,585,620	39,441,820	77,461,300
Churches	72,876,200	14,575,240	87,451,440	119,375,100
Dwellings (Below $2CM)	78,200,000	15,640,000	93,840,000	107,194,500
Dwellings ($2CM-$50M)	87,400,000	8,860,000	96,260,000	99,736,600
Dwellings (Over $50M)	72,600,000	3,630,000	76,230,000	74,591,300
Hotels	53,346,300	21,338,520	74,684,820	100,774,500
Hospitals	157,426,600	31,485,320	188,911,920	207,828,000
Industrial	343,286,900	34,328,690	377,615,590	225,270,400
Office Buildings	216,671,800	43,334,360	260,006,160	331,993,400
Public Buildings	120,269,400	12,026,940	132,296,340	426,350,800
Schools	351,524,500	70,304,900	421,829,400	444,012,500
Stores	193,141,900	13,519,933	206,661,833	90,794,500
Theatres	27,449,000	4,117,350	31,566,350	84,337,000
Transportation	74,300,000	3,715,000	78,015,000	55,042,500
Welfare, Y.M.C.A., etc.	23,600,000	1,180,000	24,780,000	35,518,300
TOTALS	$2,511,354,800	$402,948,908	$2,919,303,708	$3,179,787,200

(*) Based on figures from United States Department of Commerce and F. W. Dodge Corporation.

Architectural Forum Forecast

The gas industry suffered from the general industrial slump of 1930 rather less than almost any other nationwide industry. It is, therefore, in that much better position to be advantaged by general business recovery in 1931 and succeeding years.

Important units in the industry—perhaps enough to constitute a major part of the industry—are in process of readjustment for utilization of the immense natural gas resources uncovered in recent years. The progress of this readjustment as far as it has gone, plus the flexibility, adaptability and resourcefulness of the industry as proved in the past, tends to guarantee that the industry will come through this phase of adjustment to natural gas with advantage to itself and with entire satisfaction to the gas using public.—Bernard J. Mullaney, Vice-President, The Peoples Gas Light and Coke Company, Chicago.

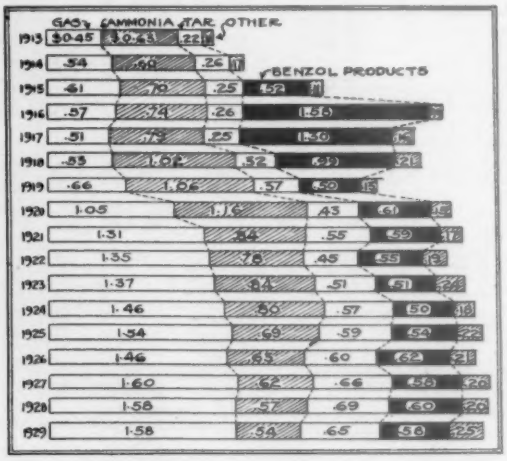


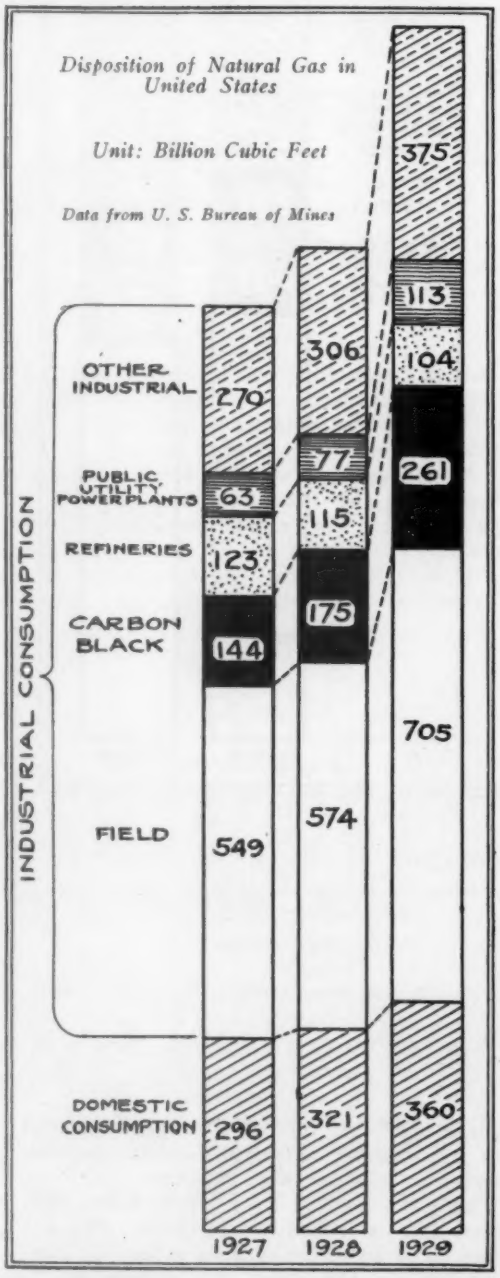
Above—Average yield of the principal by-products per net ton of coal carbonized in by-product coke ovens, 1915-1929. Figures for light oil represent the average at plants recovering light oil

Data from U. S. Bureau of Mines

Below—Gross value of the several by-products per ton of by-product coke produced, 1913-1929

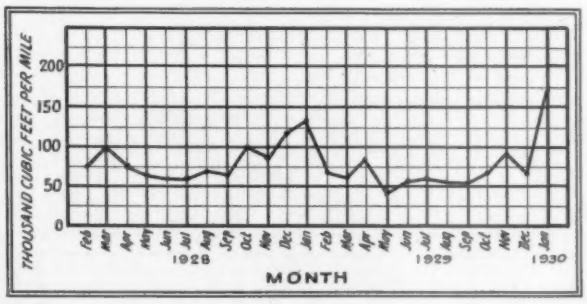
Data from U. S. Bureau of Mines





Comparison of Accounting Office and Distribution Department Methods for Ascertaining Unaccounted-For Gas

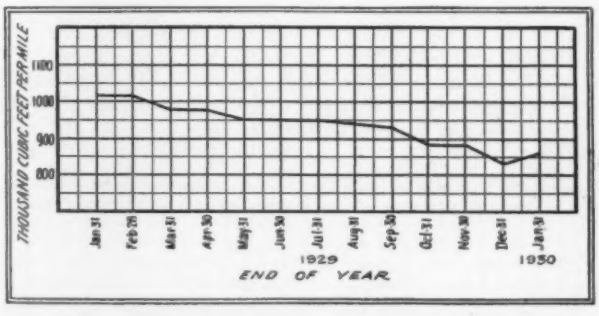
ORDINARILY unaccounted-for gas is taken as the difference between the reported sales and the reported send-out for the month. In arriving at the sales, however, it is difficult to determine the actual amount delivered to the consumers during the period in question because of the rotation of the domestic meter reading schedules. A comparative study is presented of the method in use in the accounting office of a gas company and the method suggested by the distribution department of the same company.



Graph 1—Unaccounted-For Gas per Mile of Main. Accounting Department Figures. Los Angeles Gas and Electric Corporation

To determine unaccounted-for gas by the method in use in the accounting office proceed as follows. Determine the send-out for each read day period contained in the monthly sales report and find the sum. Divide this sum by the number of read day periods and obtain an average send-out figure for a read day period. Divide the actual send-out from the first to the last of the month by the average send-out for a read day period and obtain a certain factor. Multiply the total sales as shown on the report by the factor determined above and determine what the sales would have been had they occurred from the first to the last of the month instead of during read day periods. Compare this figure to the send-out from the first to the last of the month and find the unaccounted-for gas.

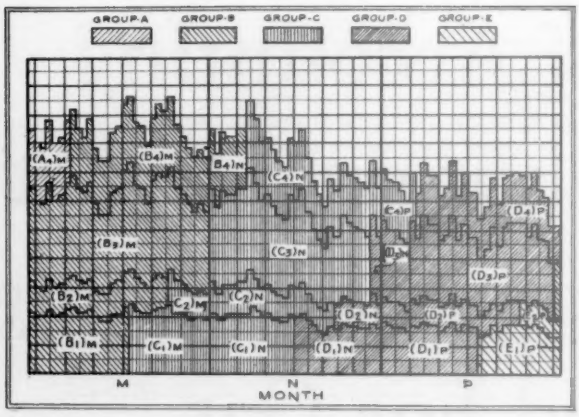
The objection to this method is found in the distortion which it gives to the individual monthly unaccounted-for figures. It is a method of approximation based on a weighted average, weighting the true sales of various read periods for the send-outs of such read periods. This weighting process, however, is applied to the total of the various read figures and not to the separate items, taking the form of a factor by which the actual consumption is multiplied, and resulting in a fictitious figure. If this method is going to be accurate in the long run, it is readily seen that the total over a period of many months should closely approximate the total of the actual consumption reported every month (that is, the actual consumption before multiplication by the weighting factor). If it does this, it would seem to be mostly chance, for, month by month, it operates in a perverse manner. As a matter of fact, the long time total is very close to the long time total of the actual consumption. The objection is not made to the long time accuracy, or lack of it, but simply to the distortion of the individual monthly figures. This distortion tends to obscure the true leakage condition existing, and makes an analysis of system leakage on a monthly basis extremely difficult. (See graphs 1 and 2.)



Graph 2—Unaccounted-For Gas per Mile of Main per Year. Accounting Department Figures. Los Angeles Gas and Electric Corporation

The ideal way to determine monthly sales would be to read all consumers' meters on the last day of the month, but this is rarely possible. For practical reasons, consumers' meters are read by sections, a section each day throughout the month. Thus, the sales are recorded by read day periods, the total for each period being a report for a part of the system only. A grouping of periods is then generally made so that a figure is obtained which largely consists of gas consumed during the calendar month and which likewise includes most of the gas consumed during that month. This figure, however, includes some gas actually consumed during the preceding month, and some gas actually consumed during the fol-

Portion of Committee Report, "Unaccounted-For Gas," presented before Pacific Coast Gas Assn., 1930.

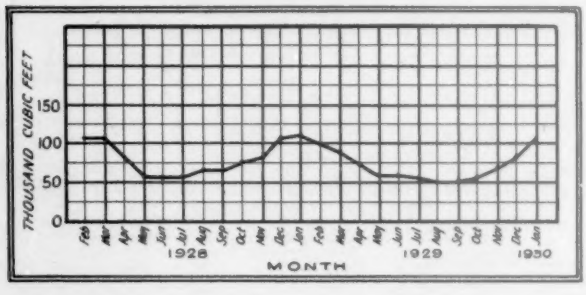


Graph 3—Sales by Months, Groups and Read Periods. Los Angeles Gas and Electric Corporation

lowing month, and excludes some gas actually consumed during the current month. The actual amount of gas consumed during the month can not be determined except by approximation. The problem is to determine what part of the sales reported for any one month actually occurred in that month, what part in the preceding month, and what part in the following month. If these parts can be determined for each report, then the various parts belonging to the same month may be assembled and the actual sales for that month will be found.

Graphic Representation

Consider the accompanying diagram, graph 3, which, for the sake of simplicity, represents a system with only four read periods. The top horizontal lines represent the total sales each day; the horizontal lines under the top line represent the sales of each section of meters read on the same day. The various groups of read periods are designated by shaded areas; the monthly divisions by vertical lines. There are three kinds of divisions,—by read periods, by groups, and by months. All sales belonging to the same read period are designated by a number (1, 2, 3, or 4); all sales belonging to the same group are designated by a large letter (A, B, C, D, or E); and all sales belonging to the same month are designated by a small letter (m, n, or p). Thus, the area designated (C 1) n represents that part of the sales which occurred in read section 1 of group C in month n.

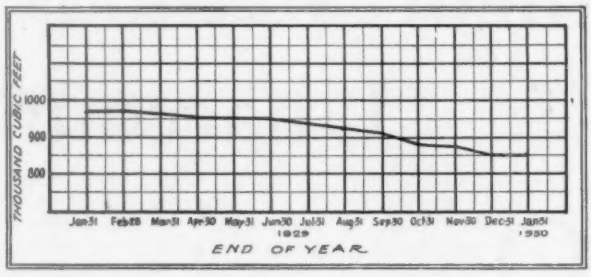


Graph 4—Unaccounted-For Gas per Mile of Main. Gas Distribution Department Figures. Los Angeles Gas and Electric Corporation

The known areas on the diagram are the various read sections (C 1)m + (C 1)n, (C 4)n + (C 4)p, etc. The various groups are also known, being merely the sums of specific read sections. The true monthly sales, for month n as an example, are (C 1)n + (D 1)n + (C 2)n + (D 2)n + (C 3)n + (D 3)n + (C 4)n + (B 4)n. Each of these items is a part of a known area, although the parts separately are unknown. To determine these parts, resort must be had to estimation. If a sound basis for dividing the various read sections into the parts of it which fall into different months can be found, and these parts determined, then the true monthly sales will be very closely approximated.

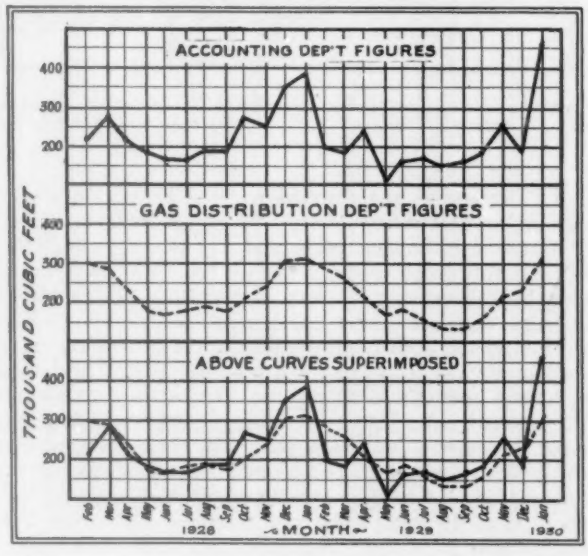
Effect of Leakage

The sales are known to vary considerably day by day, so a straight time basis for estimation is unsound. Sales vary roughly with the send-out, being simply the send-out minus the leakage. If the leakage is small as com-



Graph 5—Unaccounted-For Gas per Mile of Main for Year Ending Periods. Gas Distribution Department Figures. Los Angeles Gas and Electric Corporation

pared with the send-out, then no great amount of error is introduced by using the send-out as a basis for approximation. As the most logical basis available, at any rate, it is suggested that the parts of each read period which fall in different months be determined by the ratio of the send-outs for the corresponding periods of time involved in different months. Applying this method, the two parts (C 1)m and (C 1)n of read section (C 1)m + (C 1)n, for example, would be determined by the ratio of the sendouts for the periods of time corresponding to (C 1)m and (C 1)n. The error introduced in this calculation would be only between months; the total of the estimated parts is always exactly equal to the actual consumption of that read section. Since the parts



Graph 6—Unaccounted-For Gas. Los Angeles Gas and Electric Corporation

to which this method is applied are small parts of the whole sales, the error introduced in each would be a correspondingly small part of the total. Since each part is for a different period of time, the error of one would

tend to offset the error of another, the chances being that the errors would be as much plus as minus. The net error introduced in any one month is bound to be small.

To sum up, the actual consumption by small sections is divided into two parts according to the most reasonable basis available, that is, the send-out. The parts belonging to the same month are assembled, and the total is taken as the monthly sales. No extraneous factors are introduced, the long time sum can never be more nor less than the long time actual consumption, and, in addition, each monthly figure closely approximates the true monthly sales. Graphs 4 and 5 show curves based upon figures computed by this method. Graph 6 shows comparative curves of the accounting method and the distribution method.

The Economy of Mergers

A HIGHLY legitimate purpose in consolidation is that of making available a quality of management not to be afforded by a smaller company," Mr. Thomas R. Jones, Vice President and General Manager, Harris-Seybold-Potter Co., said at a dinner meeting of the American Management Association at Cleveland, on June 9th in an address on "Post Merger Economies."

The Gold Dust merger is such a combination. In it were no economies of merging, but there were economies in management. Other reasons for merging which Mr. Jones mentioned were: to effect internal economies in manufacture, distribution and administration; to eliminate bad merchandising conditions; to smooth sales and production variations—especially in business of highly seasonal character it is advisable to choose the product so that the peaks of the one offset the valleys of the other; for personal reasons, for example the ambition of executives to be big; pure promotional reasons, an example being an excuse for stock-jobbing operation; and technical reasons.

"The Diamond Match Company forms an interesting example of another reason for merging, that is, the utilization of byproducts," Mr. Jones went on to say. This is not a true merger. It is a growth. It originally made only matches. Because it had surplus lumber, the company established 40 lumber yards. This put it into the building supply business. Some of the lumber still left on its hands, it started to make into toys and beehives. Beehives sell better with other bee supplies, so now the company is in the apiary business too. In an endeavor to produce an income from one of its cleared lumber tracts, it planted prunes, which put it also into the fruit business. Dupont similarly branched out to Duco, Rayon, Celophane, and all familiar trade names of products based on gun cotton."

Mr. Jones then went on to show why mergers do not necessarily bring economies. "A merger is apt to precipitate a decided let-down in morale of the executives of the constituent companies. They are apt to feel that a merger ends their troubles, that they may sit back and let some one else assume their burdens. Mergers are also likely to bring the committee form of government, which is disastrous. A merger causes a shifting of jobs—the placing of men into work with which they are unfamiliar. Moreover, it has been proved to be the rule that when all managed units are brought together, the administrative expense is increased rather than lessened. Add to the above the necessity in many mergers of providing policy jobs for some of the heavy stockholders in order to get their consents to the merger, and the personnel factor looms large as a rock on which the merger ship may become wrecked."

One aftermath of the merger of companies making identical products—to the surprise of the management, is a drop in total sales. One company recently purchased a second. They estimated that sales of the purchased company would decrease 30%—and to date their estimate has proved correct. "Periodically we hear much talk of the possibility of a merger of Sears, Roebuck & Co. and Montgomery Ward. So far nothing has happened. I believe that nothing will happen," Mr. Jones said, "as it is very doubtful that one catalog will sell as much goods as two. Furthermore, such a merger would leave an opening for the ascendency of another mail-order house."

Other losses attending the merger of companies which Mr. Jones mentioned were those due to: excess assets; new investment and moving expense; inadequate or topheavy organization; development expense necessary to the realization of engineering and manufacturing savings; the problem of excess personnel; and excess financial structure.

Management is the all-important consideration in merging, Mr. Jones went on to show. "The Hahn Department Stores, Incorporated, with branches in twenty-one cities over the United States have made no economies from group control," he said. "They have no central purchasing. They maintain a complete executive staff in each store. The central organization is merely for general direction and facilitation. Economy to date has been achieved in house cleaning. This is a management economy which could have been attained in the individual stores."

In conclusion Mr. Jones said: "I have shown that it is by no means a general rule that mergers make big earnings; that many of them do not make even the sum of the earnings of constituent companies; that many mergers are made with no thought of economies arising from the merger per se; that there are many forces in a consolidation which militate against economies or which tend to create losses which offset economies; that a well designed merger achieved under certain proper conditions can make more money than the unmerged independents; that merging is not a substitute for management, and that management is the first and most important consideration. This must not be construed to decry all mergers. I merely emphasize that all is not gold that merges.

"A consolidation, to justify its existence as a consolidation, should accomplish things which were impossible to accomplish in the independent business of which it was constituted. It must produce: 1. a better product at the same price or the same product at a lesser price; 2. more stability in the industry; 3. more profit for the investor; 4. greater advance in the industry. If it is successful it will have been made up of a grouping of successful businesses on a sound and conservative capitalization, with adequate resources, competent personnel, and *will have been based on management.*"

Gas Pipe Lines Cause New Economic Problems

Conflict of interest threatens attack by railroads and brings about proposals of dangerous significance to gas industry

R. S. McBRIDE

Consulting Editor, American Gas Journal

NEW AGENCIES for energy supply always occasions new economic problems. This is inevitable, since the supply of light, heat, and power and its application to the household, to transportation, and in industry is one of the most important factors in the economic structure of the United States. It is not surprising that the tremendous development of gas pipe lines which has been going on during the past two years has caused considerable economic disturbance

Gas supply on a huge scale is now successfully competitive with fuel-oil and coal supply. The result is a supplanting of other fuels by gas at a rate never before experienced in this country. The results are being felt far beyond the coal and oil industries. The decline in consumption of coal has been a serious factor affecting the welfare of American railroads, in particular. The carriers are confronted with large decline in freight tonnages. Estimates as to the extent of coal replacement range up to 200 million tons of coal per year by 1940. Even a more conservative figure, half this size, indicates that the shrinkage in freight demand by the fuel industries will amount to many billions of ton-miles per year as the full development of natural gas and pipe-line systems is accomplished. The influence on the coal-mining industry and on labor required for mining are, of course, even more direct, and believed by some to be even more serious.

Urgent Problem

Perhaps the most important and urgent problem facing the public-utility gas business as a result of pipe-line development lies in the field of relations between the gas companies and the rail carrier systems. Some railroad executives apparently believe that they can stand in the way of technical progress and by bringing about restrictive regulation on pipe lines prevent this inroad into their transportation business. To this end they apparently are backing the idea that gas pipe lines must be made common carriers and must be subject to Federal regulation through the Interstate Commerce Commission or other Federal body. Such a proposal deserves careful consideration by gas executives because the consequences are probably even more far reaching than appear at first.

Technical consequences of making a pipe line a common carrier suggest serious difficulties at once. Let us suppose there are as few as a dozen producers of gas who desire to "ship" through the pipe line. If the line be a common carrier it must receive the gas from all of these producers for transportation at rates fixed by public authority and transmit the gas to indicated destinations on its lines promptly and in accordance with rules that doubtless would be formulated in great detail. One can imagine that the economic confusion would be quite as great as the inevitable intermingling of the commodity in the pipe line. The producer of gas of high heating value, free from inerts, and properly freed from natural gasoline would have no protection against contamination of his material with nitrogen, water vapor, condensible hydrocarbons, and other constituents offered by other shippers. Obviously, such commingling of supplies is not technically practicable nor economically sound.

In the case of oil pipe lines operating as common carriers it is feasible to store the oil to be shipped by one owner until a sufficient quantity has accumulated to warrant devoting the pipe line exclusively to that shipment until it has been transmitted. It is not difficult to fix reasonable minimums of quanity below which the pipe line may not reasonably be required to accept shipments. Similar storage of gas, one lot after another, practically without commingling, is, of course, a physical impossibility. Storage facilities, either in the field or at the destination, for quantities accumulated during a week, a month, or for a longer period are, of course, impracticable of erection and maintenance. Thus, on technical grounds alone, it seems that the making of pipe lines for gas into common carriers is an unreasonable thing.

Regulation and Good Judgment

There are perhaps certain factors in some of the present pipe-line practices against which reasonable objection may be offered. It is not altogether in the public interest for a pipe-line management arbitrarily to take gas from certain producers and refuse to take from their next neighbors, who are thereby prevented from producing gas on their property and lose it to their neighbors who can produce because they have facilities for marketing. Regulation of such matters is, however, a question of local good judgment on the part of the gathering-line and transmission-line companies. It may, if necessary, be regulated by state authority. It certainly is not a matter of Federal concern.

Another complication in public relations occasioned by

extensive pipe-line development is analogous to that which has troubled state and municipal authorities during recent years in the fair handling of electric-light and power systems. Such local authorities have a very real problem to face when determining the proper local rate for electricity, and now for gas, when a large element of cost is occasioned by operations of an interstate company that lies largely, if not wholly, beyond the jurisdiction of the state officials. Politicians have frequently made much capital out of this situation. They have alleged all manner of unfairness to the public and claimed that charges were excessive simply because they were not based on operations whose every detail was subject to state authorities' investigation and regulation. This situation still troubles the electric utilities, and it is one to which gas-company executives should give careful consideration at just this time.

Pitiless publicity is an alliterative phrase often overworked. Perhaps, however, it would be worth while to work it a bit with reference to gas pipe-line costs. Let us suppose that the state authorities are fixing a price for gas at Squash Center. They investigate the local expenses and can appraise with fair accuracy the elements of distribution cost, management charges, commercial expense, and required return on the investment in local distribution system and other property. The commission is, however, merely presented with a statement that "The Squash Center Gas company buys its gas from the Interstate Pipe-Line Company, Incorporated, for 27 cents per M." The local company cannot and the pipe-line company will not, tell the state authorities the justification for this 27 cents.

Food for Demagogues

Here is the basis for a first-class political tirade by demagogues seeking to undermine the public relations of not only this, but of all gas companies within the state. Rest assured that the more radical politicians are likely to take advantage of this opportunity to the full. The only answer to such a situation appears to be the making of a clear, unquestioned public record of costs entering into the 27 cents so that the state authorities may through the voluntary cooperation of the interstate concern go back into the records to determine to their own satisfaction the reasonableness of the 27 cents.

Modern utility regulation apparently is based on the theory that state authorities have such moral, even though they may not have such legal, authority. Certainly the state authorities are required by all present practice to determine whether capital investment made by the local company is prudent, whether their other expenditures seem reasonable, and whether items of cost allowed in rate making are proper before they are included in the rate to be charged to the public. Farseeing utility executives have agreed that similar right should be extended to state authorities with reference to price paid by local concerns for gas or electricity supplied to them by interstate corporations. The reasonableness of the price paid by the local company is of concern to the public. These utility executives say, therefore, that the officials charged with regulation are entitled to check the reasonableness of the price paid by being given adequate knowledge of the elements of cost which enter, even those running clear back to the gas field or to the water-power plant.

Gas executives may regard this demand for publicity as an unreasonable intrusion into their interstate activities. However, before they decide against granting publicity, it will be well for them to consider some of the consequences of refusal.

First, refusal will create a basis for public belief that there is some improper matter involved that the companies are afraid to disclose. This will affect general public relations and in all probability on a long-time basis.

Second, the most cordial cooperation with state authorities in securing of genuine economy for public service cannot be expected if the commission is placed between the deviling of politicians and the deep sea of secrecy on the part of the utility. Without such cooperation the difficulties and the costs of effective management are often greatly increased. It will result in actual economy to the company, as well as better feeling and a more comfortable management situation, to have a frank and open relationship maintained.

Third, a complete open record of all factors bearing on gas costs as delivered to the city limits will be the surest means of meeting the present threat of Federal regulation and the establishment of a "common carrier" basis for pipe lines. This third factor is one that deserves immediate consideration by the leaders of the American gas industry.

Railroad executives are in a very difficult position today. Confronted with a shrinking demand for their services in the important field of fuel transportation, they naturally are going to fight to retain for their corporations as much business as is possible. Some of them are bound to be foolish enough to attempt methods that represent interference with true economy and engineering progress. Some of them may be as foolish as the buggy-whip manufacturers who wanted a whip socket placed on the dash-boards of automobiles. Wiser members of the group will, however, not take such a foolish stand. They may, however, welcome for their contemporary in the transportation business, the pipe line, the same misery in detailed Federal regulation as they themselves experience. It will not be surprising, therefore, if the full weight of their extremely powerful influence be placed behind the Federal measures proposed making pipe lines subject to Interstate Commerce Commission control, and the still more dangerous proposal that pipe lines be by statute converted into common carriers.

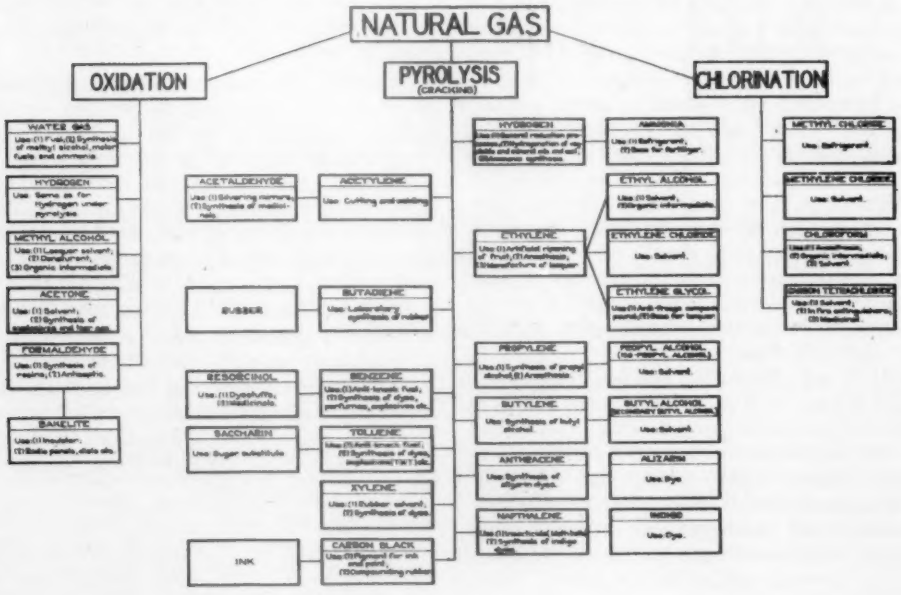
Get-together Desirable

Fortunately, some of the far-seeing executives in both utility and rail groups realize that a meeting of minds is desirable on this matter. The daily press has recently reported, and apparently reliably, that Mr. Henry L. Doherty has invited railroad executives to meet with him and other pipe-line executives to discuss this question of gas, gasoline, and crude-oil pipe lines. It is reported that Mr. Daniel Willard, President of the Baltimore and Ohio Railroad, has agreed to participate in such a conference. The utilities should take great comfort from this evidence. Mr. Doherty and Mr. Willard are outstanding figures in their respective fields. They have long been recognized as men who place the general welfare of their industries in the front rank when determining general policies. It may well be that this conference will clear up much of the difficulty that threatens. It is to be hoped that such fortunate result will follow.

It will be particularly fortunate if there can be developed some scheme whereby railroad rights of way may be utilized to the maximum safe and economic degree for the placing of pipe-line structures. By such scheme, whether the pipe line be under railroad, under utility, or under independent management, a common interest may perhaps often be served. Certainly it will

(*Continued on page 75*)

POSSIBLE UTILIZATION OF NATURAL GAS FOR THE MANUFACTURE OF CHEMICAL PRODUCTS



Putting Waste Natural Gas to Work

Government Studies its Possible Utilization of Production of Chemical Products

THE possible utilization of natural gas, now being wasted in many fields in enormous quantities, for the production of numerous valuable chemical products is being studied by the United States Bureau of Mines, Department of Commerce.

The production of oil during the early development of new oil fields is usually accompanied by large quantities of natural gas, says Harold M. Smith, associate petroleum chemist, in a report just made public by the Bureau of Mines. Since in most fields gas under pressure is the main source of the energy causing the oil to move through the sands into the wells and thence to the surface, this coincident production of natural gas will continue as long as present day producing methods are used. Generally the use of this gas is restricted, and markets are not readily available. Consequently, a large portion of the gas produced at such times is often wasted by being blown into the air.

In some of the important California fields the surplus natural gas production has run into enormous figures. In the Turner Valley field of Canada 250,000,000 cubic feet of gas is being burned daily in flambeaus, as there is no present outlet for the gas except at prohibitive cost.

Similar losses of gas occur in oil fields all over the world, and within the last few years much thought and engineering effort have been directed toward finding means of utilizing this gas profitably.

One possible method of utilization is in the manufacture of chemical products, and much work has been done on the various types of reactions that might be of commercial value. The reactions offering means of approach to the problem may be devided roughly into three general classes (1) Controlled oxidation, either with steam, or by oxygen, or by gases containing oxygen; (2) pyrolysis, the breaking up of the hydrocarbon molecules with heat and the uniting of these parts to form new substances, or, in the extreme, the decomposition to carbon and hydrogen; (3) chlorination, the replacement by chlorine of more or less hydrogen in the hydrocarbon molecules.

The Bureau of Mines has been actively studying certain of these reactions for some time, the purpose being to develop simple and economical means for utilizing gas which otherwise would be wasted. The Pittsburgh station has been studying catalytic and oxidation processes, and the Bartlesville, Okla., station has been investigating the possibilities of pyrolysis, exclusive of cracking direct to the elements carbon and hydrogen.

At present very few products can be obtained on a commercial basis by synthesis from natural gas, and in fact some products have been found only in relatively small amounts in laboratory experiments. In the present day development of chemistry, however, that which is curious today becomes commonplace tomorrow, so that in studying the possibilities of these various reactions the chemist makes no apology for considering the apparently insignificant products that are of minor commercial importance at present.

Recently there has been much interest in the hydro-

genation of oils. An important method of obtaining the necessary hydrogen is by the interaction of natural gas and steam at temperatures of about 500 degrees Centigrade or lower in the presence of catalysts such as iron oxide. The products are chiefly hydrogen and carbon dioxide. The latter is removed by suitable scrubbing, and fairly pure hydrogen is thus obtained. Its major uses are as a reducing agent in the process industries; the hydrogenation of mineral and vegetable oils and coal; and the synthetic production of ammonia, which is widely used as a refrigerant, and in the manufacture of fertilizer.

Methane also reacts with steam at 900° C. in the presence of suitable catalysts to give a mixture containing one volume of carbon monoxide and three volumes of hydrogen. This mixture of carbon monoxide and hydrogen (water-gas) is the basis for several catalytic syntheses. At high pressures and at temperatures of 200 to 400° C. in the presence of suitable catalysts water gas yields methanol (methyl or wood alcohol). Methanol is used widely as a solvent, a denaturant, and an organic intermediate in the formation of other compounds. At atmospheric pressure in the presence of iron or cobalt catalysts many compounds may be formed, among them liquid hydrocarbons and oxygenated compounds which could be blended with gasoline. Acetone, a valuable solvent and intermediate for nitrocellulose lacquers and explosives may be obtained by a similar process.

Methane, with the proper catalysts and under suitable conditions of temperature and pressure may be oxidized directly by oxygen, or oxygen-containing gases to formaldehyde and other oxygenated products. Formaldehyde has in recent years become of much importance in the synthesis of resins such as bakelite. Formaldehyde is also a valuable antiseptic.

By pyrolysis methods hydrogen may also be obtained. Other gases formed in the pyrolysis of natural gas are acetylene, butadiene, ethylene, propylene and butylene. Acetylene is used in welding and cutting metal; and may be used to prepare acetaldehyde, which is further used in silvering mirrors or in the preparation of medicinals such as chloral, a soporific. Butadiene under proper treatment condenses to form an artificial rubber having the same general composition as natural rubber. Ethylene has recently come into use in ripening fruits. It is also finding use as an anesthetic. However, its major use at present is in the synthesis of ethylene glycol, an antifreeze for water-cooled motors. Ethylene is also the basis for a series of important lacquer solvents. If desired, ethyl alcohol, widely used as a solvent, and also in the preparation of other compounds such as ether, may be prepared from ethylene. Again by the proper reaction with chlorine, ethylene chloride is formed. This is a valuable solvent, especially for fats and essential oils, and is also used as an anesthetic. Propylene finds use as an anesthetic, and also in the synthesis of isopropyl alcohol, which is being substituted for ethyl alcohol with good results in certain instances. Butylene is also used in the preparation of certain butyl alcohols which are being used as solvents in the chemical industries.

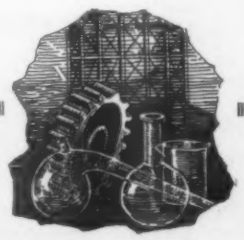
The principal liquids formed in the pyrolysis of hydrocarbon gases are benzene, toluene, and xylene. Benzene is a valuable product and forms the basis of many chemical processes. Thus are obtained aniline and the entire series of aniline dyes, and many explosives, perfumes, and medicinals. In addition benzene is an excellent solvent and antiknock motor fuel. Toluene is the basis of the familiar T.N.T. (trinitrituluol), of dyes, and of saccharin, a sugar substitute 400 times as sweet as sugar. Xylene is similarly used in the synthesis of dyes and other products, and also to a large extent as a solvent.

The solids resulting from pyrolysis are chiefly naphthalene and anthracene. Naphthalene is well known as an insecticide in the form of moth balls. It is also the basis for the important indigo dyes. Anthracene is used in the synthesis of alizarin dyestuffs. Finally, under certain conditions of cracking carbon black, widely used in making ink, compounding rubber, and as a pigment for paint, is obtained.

Chlorination is generally applied to methane, although the other gases may be chlorinated. From methane four products may be made: Methyle chloride, much used as a refrigerant; methylene chloride, a solvent; chloroform, a general anesthetic, solvent, and intermediate in the formation of other compounds; carbon tetrachloride, a solvent, used in fire extinguishers and medicinally in combatting the hook worm.

Even if the technical difficulties attendant upon the commercial production of the various products mentioned are solved, the economic side of the problem should receive serious consideration. Since, however, the raw material under consideration is virtually a waste product, any return, however small, would be profitable and an aid to conservation of natural resources. Moreover, it has happened many times in the development of the chemical industries that the large production of a chemical product at an attractive price has stimulated its use. For example, benzene, which at present is too high in price for widespread use as an antiknock medium in motor fuel, would undoubtedly be attractive to many refiners if available at a more moderate cost. Finally, most of these processes, while they may appear simple on paper, probably will not be ready for general use for several years, as there are many technical difficulties to be solved before commercial application is feasible. When the processes are ready for commercial use many of the present economic hindrances may have disappeared. But regardless of economic considerations the study of these reactions involving the use of natural gas is of importance both at present and for the future, for, as mentioned previously, that which is a chemical curiosity today becomes the commonplace and important chemical tomorrow.

Further details are given in Information Circular 6388, "Possible Utilization of Natural Gas for the Production of Chemical Products," copies of which may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.



The Mechanical Grate

JOHN H. WOLFE

Superintendent, Gas Manufacturing, Consolidated Gas Electric Light & Power Co., Baltimore, Md.

(*Continued from December issue*)

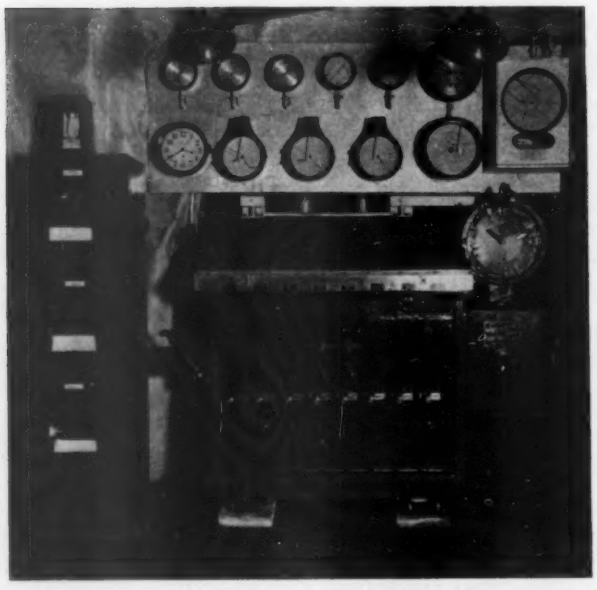


Fig. 12—Recording and Indicating Instruments on Set equipped with Automatic Grate. Spring Gardens Station, Consolidated Gas Electric Light & Power Co., Baltimore

Recording Instruments and Operating Records

IN order to do an efficient job of operating any machine it is necessary to maintain accurate records of the input of raw materials and output of finished materials. With an automatic machine this becomes still more important. The writer recommends that, with a mechanical grate, the following recorders will pay the cost of their installation many times over:

(1) Flow recorder on blast air to generator.
(2) Flow recorder on blast air to carburetter.
(3) Flow recorder on steam to generator.
(4) Differential recorder, loss through generator.
(5) Pyrometers (recording), top of carburetter, bottom of superheater, and top of superheater.
(6) Ammeter (recording) on driving motor.
(7) Flow recorder or recorders on steam produced on waste heat boiler and water jacket.

Figure No. 12 shows an installation of the recording instruments outlined above, as well as the necessary indicating gages.

The record obtained on gage No. 4 is particularly important, in that it shows the trend of pressure loss through the generator, and thus gives the operator advance notice of bad fire or clinker conditions by showing an increase in the back pressure through the fire. Trouble can often be averted by changing the air and steam balance, whereupon the chart record will respond by returning to normal.

The current consumption, as registered on recorder No. 6, is a valuable criterion of the load on the driving motor, and will foretell any departure from normal operations. Should the clinker become too hard or gummy the ash removal load is increased, which is reflected on the ammeter. Here again prompt action by changing the proportions of steam and air may prevent a shut down.

In order to prevent the overloading and damaging of the A.B.C. grate the driving mechanism is equipped with a shear pin which breaks when the stress reaches a predetermined point.

Other records which are required are as follows:

(1) Record of fuel charged per hour.
(2) Record of oil used per hour.
(3) Record of number of runs made per hour.
(4) Record of interruptions to generation, with reason therefor.
(5) Record of time of ash removal and weight of ash removed per dump.
(6) Record of gas made per hour.
(7) Record of ratio of cubic feet of air used per pound of steam.
(8) Record of percentage of weight of ash removed to weight of fuel charged.
(9) Record of fuel analysis determined on representative sample taken over one week.
(10) Record of ash analysis determined on representative sample taken over one week.
(11) Record of clinker location.

From the above data operating efficiencies can be calculated and results compared. Item No. 11 is determined on the basis of measurements on ½" diameter test rods which are inserted into the fire about every three or four hours through sight cocks. The rods are allowed to remain for several minutes and are then pulled out and the heated portions measured and the location of the fire zone is plotted from these measurements. By this means an accurate picture of the fire can be drawn which is of value in controlling fuel bed conditions. This method is used with all U.G.I. machines.

Desirability of Additional Automatic Equipment

Since the automatic grate is able to perform the functions of maintaing a clean and active generator and of removing the ash produced, it would seem wise to further automatize the generator and set by the addition of such proven equipment as an automatic charger, to deliver the generator fuel to the set in uniform and predetermined weights per cycle, and automatic volume regulators to control the input of air and steam, and to

maintain them at a uniform rate, cycle after cycle. It is certain that such automatization will remove many of the variables which now prevent the automatic grate from being the complete success which it might be in every installation. Man has worked throughout the ages to secure control of his combined friends and enemies, fire, wind, and water, and there is now available the equipment which will enable him to secure complete and accurate control of all three. Why not utilize them so that the highest efficiency may be achieved?

Maintenance

This is a subject of vital concern to every operator, as high maintenance costs may to a large extent nullify other savings, and thus reduce the attractiveness of an installation. The manufacturers are aware of this and are continually seeking to improve the design and construction of their machines as experience directs.

Extremely severe conditions exist at the base of a generator. The grate must be able to withstand highly corrosive and abrasive conditions. The atmosphere surrounding it is alternately oxidizing and reducing. Moisture is always present in the form of condensed steam. The steam and back or down run gases are wet, and the latter is laden with hydrogen sulphide. Some cokes, which are quenched with brackish or salty water, contain chlorides, particularly magnesium chloride, which breaks down readily releasing gaseous chlorine. This attacks the metal avidly, particularly steel. Add to these destructive forces the effect of rapid changes of temperature and the scouring and scrubbing of coke and ash which continually presents to the gases a fresh surface for oxidation and corrosion, and one realizes why the destruction of equipment is so rapid. Moisture condensing in the ashes leaches out sulphur acids which add their forces to assist in the general destruction. With this picture in mind one realizes that only the most resistant metals and alloys must be used if low maintenance is to result. Where it is impossible to entirely guard against these effects small, cheap, and easily replaceable parts should be installed.

Unfortunately, maintenance costs are not readily determinable on installations made to date, for several reasons. In the first place the first units were largely experimental in nature and changes, and improvements were made from time to time so that actual maintenance and replacement costs could not be segregated.

Secondly, some of the first installations, although they have been installed for a long time, have been operated for but a short time in the aggregate.

Thirdly, improvements are continually being made and these have, in many cases, been added to existing machines. This assists in reducing maintenance costs because any changes made have taken into consideration the maintenance cost factor.

Structural defects of the A.B.C. grate, which have been or are in process of being corrected, are as follows:

(1) Weak internal supporting spider. Corrected.

(2) Breaker Beams. Design and distribution of water have been changed and methods of replacing wear standardized.

(3) Drive mechanism. This has been designed to obviate points of wear.

(4) Erosion of water cooled crusher sections. Overcome by installing dry wall of fire brick.

(5) Burning of grate segments. Improved design has facilitated air and steam distribution and has prevented burning.

Structural defects of the U.G.I. grate, which have been or are being remedied, are as follows:

(1) Stopping up and burning of cone or grate segments. This has been corrected by redesigning.

(2) Cracking of crusher ring. A change in design has provided for reduction of strain due to centering of cone grate.

(3) Checking and cracking of ash pan. This has been eliminated by the use of expansion joints in the new design.

(4) Wearing of clinker extractors. An improved design has been made to insure longer life.

(5) Erosion of inner face of boiler jacket. It is expected that this can be compensated for by welding strips on the inner sheet so that the whole sheet will not have to be renewed.

The maintenance data, which have been reported through the Water Gas Committee of the American Gas Association, are as follows:

1927 A.G.A. Proceedings

A.B.C. Grate at Chicago By-Product Coke Company.

Maintenance estimated at $1400.00 per year per machine more than maintenance on hand cleaned set.

1928 A.G.A. Proceedings

A.B.C. Grate at Chicago By—Product Coke Company.

Over a period of seventeen months' operation an average of 3.4 days per month was lost due to checkering, grate repairs, general overhauling of set and standby time. Wear on ends of breaker beams was reduced by applying Stellite, an alloy very resistant to abrasion.

1929 A.G.A. Proceedings

A.B.C. Grate at Minneapolis Gas Light Company.

A comparison of total set maintenance, including grate repair, checkering, etc., of the automatic grate with the hand cleaned set brought out the following costs:

	Total Set Maintenance	Maintenance c per M.	Gas made per set year
Per Automatic Grate Set	$7656	0.61	1,254,000 M
Per Hand Cleaned Set	$3384	0.34	990,000 M
Volume equivalent on Hand Cleaned	$4285	0.34	1,254,000 M
Comparative Excess of Automatic	$3371	0.27	...

A.B.C. Grates at Kings County Lighting Company.

Reported maintenance cost of Automatic Grate sets to be the same as hand cleaned sets.

1930 A.G.A. Proceedings

A.B.C. Grates at Kings County Lighting Company.

Maintenance costs for water gas sets was lower in 1929 than in 1928, proving to them that mechanical grates are not excessive on maintenance.

Additional maintenance data, obtained from private sources, are as follows:

A.B.C. Grates at Consolidated Gas Electric Light and Power Company at Baltimore.

Maintenance costs on generator, including grate, over a period of three years, or 41,793 operating hours, averaged $525.00 per thousand operating hours, or 0.19c per M. The set with highest maintenance cost averaged $749.00 per thousand operating hours, or 0.27c per M., while the set with lowest cost averaged $324.00 per thousand operating hours, or 0.12c per M.

Haug or U.G.I. Grate on one of older installations.

Total maintenance cost of generator, including jacket was $1180.00 for a gas production of 1,526,500 M, or 0.08c per M.

Operating Results

A review was made of published results over the period of 1927 to 1930, inclusive, and the following summary made so as to gather together the scattered data for the convenience of the reader. All of this data was gleaned from A.G.A. Proceedings, Report of Water Gas Committees, and the year of report will be noted as heading under Company name—

A.B.C. Automatic Grates.

Chicago By-Product Coke Corporation.

1927. The following computed saving of the automatic grate, as against hand cleaned sets, was reported.

Oil .....0.2 gal. per M.
Fuel—Coke (Ash 7.73%) .....2.0 lbs. per M.
Steam decomposition was 18% higher on automatic grate

1928. The steam decomposition on the automatic grate was 61% to 62% complete, and it used 10% less steam than the hand cleaned sets. Blue gas quality was 303 B.t.u. per cubic foot. A 56 hour test run showed as follows:

Coke (Ash 10.5%) ..... 26.97 lbs. per M.
Steam ..... 27.4 lbs. per M.
Make ..... 212 M. cu. ft. per set hour

1929. Comparison of automatic grate and hand cleaned sets showed as follows:

	Automatic Grate	Hand Cleaned Sets
Steam Decomposition	62%	50%
Blue Gas B.t.u. per cu. ft.	303	290

Consolidated Gas Electric Light and Power Company of Baltimore.

1928. Saving of completely automatic set over hand cleaned operation is ½ to 1 lb. of generator fuel (coke) per M, and 0.1 gal. of oil per M, and 8% of generator steam consumption. Capacities can be adjusted to meet operating conditions over a range of 3,800 M to 4,800 M per set day.

Detroit City Gas Company.

1930. Automatic grate showed saving of 0.99 lbs. of generator fuel (bituminous coal) per M, but increased oil consumption of .04 gals. per M as against hand cleaned operation. Also, make increased 1,480 cu. ft. per set hour and 320 M per set day with a 1.89 hours per set day increase in productive time.

Kings County Lighting Company

1929. Reported following results:

Period	Operation	Lbs. Coke per M.
5 months last year	Hand Cleaned	29.5
5 months this year	Automatic Grates	29.3
2 months following	Automatic Grates	28.4

1930. Reported make per set hour.

No. 6 Automatic Grate .....200 M
No 7 Automatic Grate .....199 M

Results in 1929 showed saving of 1.2 lbs. of coke per M, with slightly better oil results as against hand cleaned operation. Automatic operation produces from 12% to 15% more gas per set day of average 23.6 hours operation. Tests on brick lined crusher sections showed a saving of 0.2 lbs. coke per M, as against water cooled crusher section operation.

Minneapolis Gas Light Company.

1928. A 140 hour test indicated:

Coke (Ash 6.9%) ..... 27.3 lbs. per M
Oil ..... 3.56 gals. per M
Make ..... 201.3 M. cu. ft. per set hour

Bituminous Coal Operations showed:

Coal (Ash 2.4%) ..... 27.0 lbs. per M
Oil ..... 3.4 gals. per M
Make ..... 153 M cu. ft. per set hour

and over a series of coals an average of

Coal ..... 26-28.5 lbs. per M
Oil ..... 3.2- 3.5 gals per M
B.t.u. ..... 550-580 per cu. ft.
Make ..... 110-160 M cu. ft. per set hour

1929. Reports on Bituminous Coal operations indicated:

Coal (Ash 2.3%) ..... 26.8 lbs. per M
Oil ..... 3.6 gals. per M
B.t.u. 570
Make ..... 163 M cu. ft. per set hour
Steam Used ..... 31.8 lbs. per M
Fuel saving 3 lbs. per M.

1930. Further Report on Bituminous Coal operation showed:

Coal (3.3% Ash) ..... 28.1 lbs. per M
Oil ..... 3.49 gals. per M
B.t.u. 570
Make ..... 161 M cu. ft. per set hour

Haug or U.G.I. Automatic Grates.

Installation at Camden. Public Service Electric and Gas Company of N. J.

1930. Results over various periods showed as follows:

	Results prior to change	Oct., 1929 after change	Nov., 1929 3 weeks test
Coke, lbs. per M	33.5	28.4	27.3
Oil, gals. per M	3.01	3.34	3.4
B.t.u.	526	540	539
Make M cu. ft. per set day		3,685	3,703

Installation at Chester, Pa., Philadelphia Electric Co.

1930. Results on reforming oil gas were as follows:

	One Month's Operations	Average Operations
Coke, lbs. per M	10.8	12.0
Oil Gas, Therms per M	...	4.2
Make, M cu. ft. per set day	4,470	6,000
B.t.u.	about 525	520

Installation at Industrial Plant.

1930. Results on Blue Gas Production were as below:

	7 day period	7 day-period
Coke, lbs. per M	32	33.5
B.t.u.	288	294
Make M cu. ft. per set day	4200	4865

Installation at New Bedford Gas and Edison Light.

1930. Detailed reports on operation are as follows:

	May, 1929 to July, 1929 incl.	Aug., 1929 to Oct., 1929 incl	Oct. 1929	Nov. 1929	Nov., 1929 to Feb., 1930 incl.	June, 1929 to May, 1930 incl.
Coke, lbs. per M (Ash 8%)	29.9	27.3	27.5	26.8	27.7	27.8
Oil, gals per M	3.4	3.25	3.27	3.09	3.27	3.25
B.t.u	...	...	...	542	...	...
Make, M cu. ft. per set hour	174.0	188.3	189.0	198.0	208.0	199.3

Installation at Philadelphia Gas Works Co.

1928 Results on Blue Gas Production showed:

Coke. Lbs per M 31.8
Make, M cu. ft. per set day 3,007

1930. Carburetted Water Gas Manufacturing Results indicated:

	2 weeks test	Nov. 13-21, 1929 8 days test
Coke, lbs. per M	23.00	22.85
Oil, gals. per M	3.86	3.84
B.t.u.	534	533
Oil Efficiency 300/70	81,600	
Oil Efficiency 237/44	87,200	
Steam used, lbs. per M	...	29.5
Make, M. cu. ft. per set day	6,124	6,092
Blue Gas B.t.u.	237	...

Installation at West Conshohocken, Pa.

1927. A test run of 149.85 hours showed:

Coke, lbs. per M	29.94
Oil, gals. per M	2.60
B.t.u.	484
Oil Efficiency 300/65	91.070
Make, M cu. ft. per set hour	160.45
Make M cu. ft. per set day	3,767
Steam used, lbs. per M	51.31
Steam made, jacket, lbs. per M	19.78
Steam to purge, lbs. per M	5.21
Steam make up, lbs. per M	26.33
Steam make up, total, lbs. per M	31.63

1928. Results were as follows:

	April and May 1927	June 1927	March 1928
Coke, lbs. per M	28.6	26.0	29.3
Coke, kind	Piling	Vinton	Camden
Oil, gals. per M	2.63	2.09	2.12
Make, M. cu. ft. per set day	3750	3850	4225

Under published results generator cooling water and steam heat losses were as follows:

A.B.C. Grate.

Location	Year Reported	Loss From	Fuel	lbs. per M
Chicago	1928	Crusher walls & beam	Coke	0.5
Mineapolis	1928	Crusher walls & beam	Coal	0.47–.51
Chicago	1929	Crusher walls & beam	Coke	0.5
Chicago	1929	Beam	Coke	0.2
Kings County	1929	Crusher walls & beam	Coke	0.5
Kings County	1930	Beam	Coke	0.3
Detroit	1930	Crusher walls & beam	Coal	0.53
Baltimore	*	Crusher walls & beam	Coke	0.5

* Inserted by author.

Haug or U.G.I. Grate.

Location	Year Reported	Loss From	Fuel	Lbs. Steam per M
West Conshohocken	1928	Jacket	Coke	19.78
Philadelphia Gas Works	1930	Jacket	Coke	15.00
Camden	1930	Jacket	Coke	12.00
Average Production	1930	Jacket	Coke	20.00

The carbon losses in ash from automatic grates were reported as follows:

Type Grate	Location	Year Reported	Period	Fuel	% Carbon	% of Fuel Charged
A.B.C.	Chicago	1927	—	Coke	15 Avg.	—
A.B.C.	Chicago	1928	13 mo.	Coke	14.64	—
A.B.C.	Chicago	1929	1928 yr.	Coke	12.00	—
H'nd Clean'd	Chic'go	1929	1928 yr.	Coke	30-40	—
A.B.C.	Minn.	1928	—	Coke	15 Avg.	0.98
A.B.C.	Minn.	1928	—	Coal	13.5 Avg.	0.31
A.B.C.	Baltmre	1928-29	—	Coke	15 Avg.	—
U.G.I.	N. Bedf'd	1930	—	Coke	12-20	—
U.G.I.	Phila. Gas Works	1930	—	Coke	12	—

Miscellaneous Data

Several items of interest which show the trend in automatic grate operation are as follows:

Relation of Percentage of Down or Back Run Steam and Fusion Point of Ash with A.B.C. Grates:

Location	Yr. Reported	Run	% Run	Ash Fusion Point	of Fuel
Chicago	1927-28	Down	63.5	2300	— Coke
Chicago	1927-28	Down	73	2650	— Coke
Baltimore	1928	Back	60	2300-50	— Coke
Baltimore	Present	Back	45	2250	— Coke
Minneapolis	1929	Back	69	—	— Bit. Coal
Minneapolis	1929	Back	73	—	— Bit. Coal

Time Lost in Removing Ashes on Automatic Grates:

Kind of Grate	Location	Year Reported	No. of Dumps per day	Time Lost per day	Fuel
A.B.C.	Chicago	1927	4	—	Coke
A.B.C.	Minneapolis	1928	2	12 min.	Coke
A.B.C.	Minneapolis	1928	1	12 min.	Coal
A.B.C.	Baltimore	1928	5	30 min.	Coke
A.B.C.	Baltimore	1929	3—4	35 min.	Coke
U.G.I.	West Conshohocken	1927	—	30 min.	Coke
U.G.I.	New Bedford	1930	4	80 min.	Coke

Savings Reported:

The figures tabulated below are the labor, fuel and oil and total savings which were reported in dollars in the A.G.A. Water Gas Committee Reports.

Labor Saving Per Machine.

Kind of Grate	Location	Year Reported	Saving per M	Annual Saving	Fuel
A.B.C.	Chicago	1927	—	$7875	Coke
A.B.C.	Minneapolis	1929	—	$5475	Coal
A.B.C.	Detroit	1930	—	$2805	Coal
U.G.I.	Camden	1930	13c.	—	Coke

Fuel and Oil Saving Per Machine.

Kind of Grate	Location	Year Reported	Per M Saving in Lbs.	An'l Saving —Dollars
A.B.C.	Minneapolis	1929	3 (Coal)	14,691.
A.B.C.	Detroit	1930		465.

Net Saving (Total) Per Machine.

Kind of Grate	Location	Year Reported	Saving c per M	Annual Saving —Dollars	Saved on
A.B.C.	Chicago	1927	—	6475 Est.	Labor less maintenance
A.B.C.	Chicago	1929	—	7000 Est.	Labor less maintenance
A.B.C.	Minneapolis	1929	—	16795 Est.	Labor, Fuels less maintenance
A.B.C.	Detroit	1930	—	8482 Est.	Labor, Fuel, Oil maintenance and Interest Charges
U.G.I.	N. Bedford	1930	3	—	Holder Cost

Conclusion

The theoretical and practical description of the application of the automatic grate is given. It is hoped that the information contained in this article will enable gas plant operators to analyze their respective problems with a view to determining the suitability and practicality of an automatic grate installation for their local situation. The writer has endeavored to present plain and unvarnished facts without bias and hopes that general good and continued healthy growth will result. He wishes to thank Mr. J. S. Haug, Consulting Gas Engineer, United Engineers and Constructors for the loan of photographs of his equipment.

To The Vanishing Point

How the Baltimore Company Is Using the A. G. A. Employee-Customer Relations Course to Eliminate Any Chance of Misunderstanding With Its Customers

HENRY M. RILEY
Editor, American Gas Journal

Foyer of Customers' Hall, Consolidated Gas Electric Light & Power Company, Baltimore, where folks are made to feel at home

IT is probably a fact that the comparatively small number of the gas industry's employees who give offense when contacting the customer are motivated by no inherently bad intentions. That is, they do not go out of their way deliberately in order to give the customer a kick on the shins, so to speak. Moreover, it is quite likely that they eventually suffer a mental flare-back that is provocative of considerably more distress than is experienced by the customer.

Here then, it would seem, we have a condition where a few employees inadvertently antagonize the customer, largely because their latent qualities for wearing well with people have not been cultivated and developed. Obviously, the remedy lies in supplying some sort of schooling for developing backward personalities and guaranteeing that good intentions yield the desired dividend of good-will toward the gas company. And here, to digress, one would do well to realize that the gas industry must view the matter of good customer relations as something more than a principle to be followed solely because it is good dollars-and-cents business to do so. A modicum of altruism should be injected into the question. Perhaps sight has been lost of the fact that the efficiently genial employee is a tolerably handy fixture to have around and also the pleasure derived from conducting business on a cheerful plane is something very difficult to measure with a monetary yardstick.

American Gas Association has recently brought out a course in Employee-Customer Relations which bids fair to supply a long-felt want by way of educating not only backward employees, but all who come in close contact with the customer and public in general. No attempt will be made in this article to delve deeply into a description of the course which, though only a few months in operation, is now subscribed to by more than four thousand of employees from a number of our largest and most successfully run gas companies. Herewith is reproduced a specimen page from the course's prospectus which gives a fair idea of the ground covered.

Leaders Group headed by Mr. Preston Hipsley

The Consolidated Gas Electric Light and Power Company of Baltimore, an organization which has been well in the van of progressive and efficiently managed gas companies for more than a century, is meeting with unusual success with the course. Clearly, this company is laying its plans to the end that misunderstandings with customers will be at the vanishing point. And, let it be understood, the Baltimore organization has travelled with pretty select company for a number of years when the matter of good customer relations is being considered.

When the course was first undertaken by this company no pressure whatever was brought to bear by the management in order to secure enroll-

ment; merely a brief letter from Mr. C. M. Cohn, Vice-President, outlining the course and its advantages. Within a space of time measured by days, after this letter had been sent out six hundred and forty-one employees had marshalled under the banner of "still better service" and tackled the course with a gusto sufficient to cause the envy of a Phi Beta Kappa. These employees were divided into groups, each having a leader of long experience in successfully contacting the public. Below is given a roster of leaders, the department their group is drawn from and the number taking the course. It is interesting to note that the summated lengths of service of these 31 leaders with the Baltimore company, total 400 years. Further, they include sales engineers, chief clerks, telephone complaint clerks, collection supervisors, investigators, etc.

CONSOLIDATED GAS ELECTRIC LIGHT AND POWER COMPANY OF BALTIMORE

Department	No.	Leader
Application	43	H. P. Knighton
Billing	74	(F. B. Gatchell (H. N. Waters
Building Service	11	R. R. Eavey
Credit and Collection	97	(H. L. Muse W. A. Debus J. K. Fassel H. S. Flayhart J. G. Kines (W. L. Schipferling (E. D. Spedden (J. G. Shettle
District Steam Sales	8	D. C. Turnbull
Educational	1	Meets with other groups
Electric Distribution	47	J. V. Ilgenfritz
Fitting	24	C. H. Kruelle
Gas Engineers	13	E. L. Harp, Jr.
Gas Laboratory	4	M. A. Pusateri
Gas and Steam Distribution	1	Meets with other groups
Operating Office	37	J. B. Lauer
General Service	35	(W. H. Carpenter (C. J. Langgood O. A. Bethke R. P. Stansbury
Harford District-Clerical	9	Henry T. Weisheit
Industrial Fuel	10	G. H. Carl
Industrial Power	2	Meets with other groups
Lighting Service	10	J. C. Fisher
Main and Service	23	Smallwood L. Wolfe
Main and Service Extension	20	J. F. Goldbeck
Merchandise	25	John C. Spedden
Meter and Installation	13	F. H. Rogers
Meter Reading and Bill Distributing	80	G. H. Baker
Timber	1	Meets with other groups
Telephone (P.B.X.)	4	Meets with other groups

THE ANNAPOLIS AND CHESAPEAKE BAY POWER COMPANY

Various departments	49	S. Preston Hipsley
Total enrollment	641	

On signing up for the course the student agrees to pay the sum of $15 which covers the cost of the lesson books and other service. In the case of the Baltimore company the student has the option of permitting the management to deduct this amount in equal installments from his pay check. In the event of successful completion of the course the management agrees to refund all of the fifteen dollars. Surely, this makes the road to learning about as "royal" as one could expect. However, it should be understood that the course *must* be completed to the satisfaction of the management and the leaders. In this connection, it is interesting to note that the leaders themselves must "be on their toes," so that they can properly advise their classes and settle any knotty problems.

The meetings of the groups which are held both during and after business hours—this condition is teamwork between employer and employee in its highest sense—last for at least one hour and are replete with discussion. The men are supposed to have previously studied the text, which sets forth right and wrong contact methods, and to have brought into the meeting for discussion parallel cases actually encountered during their daily work. Fortunately, many times a friendly if heated

The six units of the Course are as follows:

BOOKLET I—*What the Customer Wants*

In this unit the buying public is considered. What people buy, why they buy, how they judge business concerns, what makes them angry, what makes them pleased. The utility business is considered from the standpoint of the customer.

BOOKLET II—*The Gas Company's Business*

The second unit of the course considers the business from the standpoint of the Company, emphasizing the fact that this is not vitally different from the interest of the public. The cost of manufacture, the State regulation of rates, the elements of service for which the public pays, the capital investment, the responsibilities of the business are discussed briefly.

BOOKLET III—*Customer Contacts*

Here the philosophy of the whole training program is developed into the practical procedure of dealing directly with the customer in personal contacts. The angry customer and the unreasonable customer as well as the normal individual receive attention as interesting problems. Special situations, as in the customer's home and over the telephone, add to the range of these problems.

BOOKLET IV—*The Special Jobs*

Such special contact situations as are involved in the specialized jobs are dealt with not only for the sake of the holders of those jobs, but also for the information and development of general appreciation among all whose work may reasonably require something more than their own narrow job viewpoint.

BOOKLET V—*Making the Business Grow*

The necessity of making the business keep pace with its opportunities for wider service is the central theme of this unit. Emphasis is laid upon the value of the expanding service as one without which industrial civilization can't afford to get along. To this end there is special stress on getting rid of one's own standard of price levels and substituting therefor the varying price levels of various types of customers.

BOOKLET VI—*Every Employee a Salesman*

The final unit of the course builds its argument about the need for the salesmanship viewpoint in all the work of contact employees. The service of every worker in the company is part of what the customer buys. How best to make the public realize the value of that part of the bargain can well occupy the attention of employees.

Specimen page from American Gas Association Prospectus on Employee-Customer Relations Course

controversy arises relative to the proper handling of the problem and an actual case; thereupon a vote is taken of the opinion of the entire class and the results of the same entered on a blackboard. But even here the matter does not rest, since the men frequently carry on a discussion of the particular question on the outside. Often the leader will bring up a hypothetical question for discussion and decision.

After a successful completion of the course which runs about six months for the average man, a small certificate is presented. This certificate which is signed by the company's Director of Education, Mr. E. B. Luce, and is uniform with certificates presented for other courses of study is much prized by Consolidated's employees.

To summarize, this course as carried out by the Balti-

(*Continued on page 55*)

Coke Oven Operation and Maintenance

Instrument Maintenance, Proper Draft Setting and Miscellaneous Procedure

F. J. PFLUKE
Rochester Gas & Electric Corporation

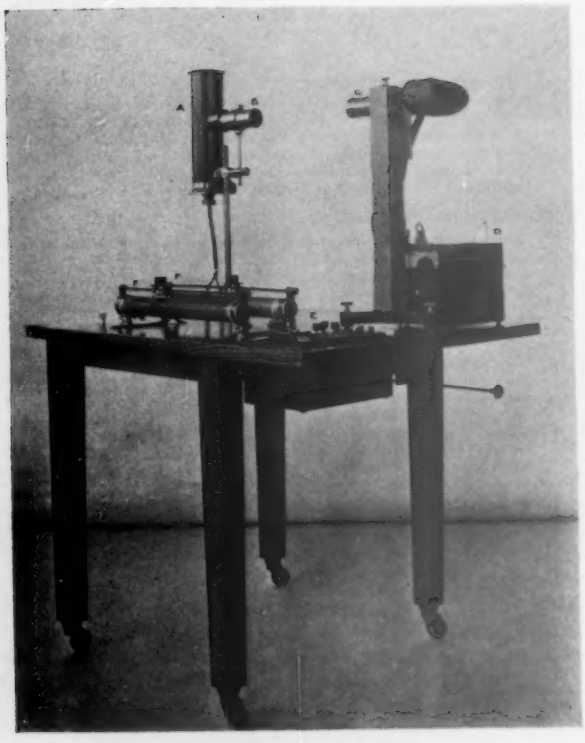


Fig. 1—Pyrometer Test Table

LONG oven life and efficient operation are to a very large extent dependent upon the heating operation. The heating of a battery should always be under the supervision of a reliable and competent heater. He should constantly strive to maintain adequate and uniform flue temperatures to produce a good quality coke which will result in added oven life. Excessively high flue temperatures are apt to cause hard pushing with resulting damage to the oven walls as well as an increase in breeze production due to breaking of the overcoked product. Similarly excessively low flue temperatures cause hard pushing and green coke which is objectionable to the customer. Constant vigilance on the part of the heater is absolutely essential in order to maintain the uniform heating conditions so necessary. Every heater has his pet ideas as to how to heat his battery and it is not the purpose of this article to set down any hard and fast rules for him. I shall merely try to point out some of the difficulties which are apt to occur and evolve an inspection schedule which if closely followed will enable the heater to correct them before damage is done. In this article we shall discuss the subject of heating in general while in the next chapter we shall touch more specifically on producer gas heating, oven gas heating and routine tests necessary for efficient heat control.

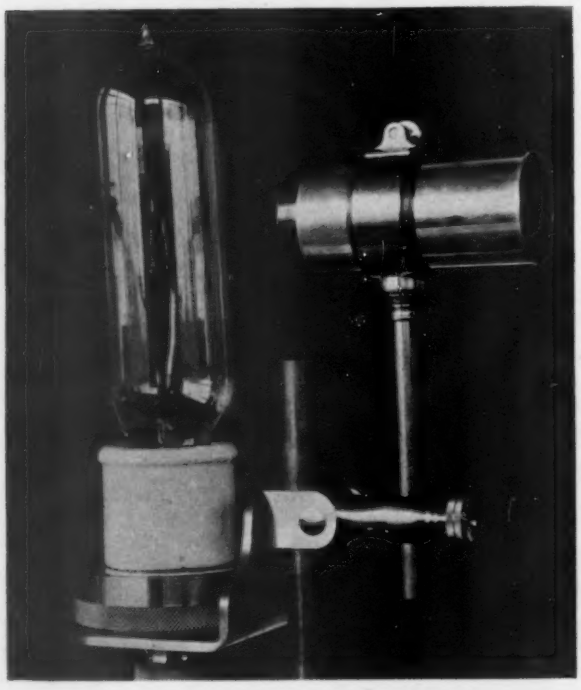


Fig. 2—Comparison Lamp and Lens

For efficient heat control the battery should be equipped with a sufficient number of accurate instruments to enable the heater to know at all times the temperature and pressure conditions in the entire setting.

The following instruments are absolutely essential for good, safe operation.

1. The fuel gas main should be provided with

a mercury and recording thermometer and a recording pressure gauge of the hydro type.

2. The foul gas collector main of each battery should be provided with a recording hydro type pressure gauge and a mercury thermometer.

3. The flush liquor main of each battery should be provided with an indicating pressure gauge.

4. The waste gas flue of each battery should have a pyrometer or recording thermometer of a rugged type and a recording hydro pressure gauge.

5. For determination of flue temperatures there should be available at least two optical pyrometers of a reliable make. Extra lamps for these pyrometers should be on hand.

6. If oven gas is used as fuel a meter and calorimeter are desirable although not absolutely necessary.

7. An orsat apparatus should be provided for flue analyses.

8. A draft gauge of the Ellison type should be available for draft setting.

Maintenance of Instruments

The instruments enumerated above should be kept in perfect working order at all times and should be checked as frequently as necessary to insure absolute accuracy. The gas connections on the hydro gauges become plugged with tar or dust and these connections must be cleaned frequently to insure continued sensitivity of the gauges.

All recording thermometers should be checked against a mercury thermometer at least once a shift. It is well to check the mercury thermometers periodically against a new or factory checked thermometer by inserting both in a pail of water the temperature of which should be varied by adding hot or cold water.

Meters should be cleaned and checked frequently. The meter throat or orifice of the oven gas meter will build up with napthalene and should be steamed frequently. Very often the producer gas meter throat or orifice will collect tar and dust which can most readily be removed by rodding.

Perhaps the most important and at the same time most delicate of all instruments used by the heater is the optical pyrometer. Upon the accuracy of this instrument is dependent to a large extent the safety of the oven brick work. This is especially true when operating on a fast coking time which requires temperatures very near to the softening point of the brick. Because of the dust and heat to which the instrument is constantly exposed it should receive very careful attention, and should be frequently checked. The telescope lenses should be cleaned daily and the screen for high temperature readings kept free of dust. A very small dust accumulation on either the screen or lenses may cause a reading 50° low. All electrical connections should be frequently cleaned and kept tight. The source of current for the pyrometer lamp should be kept in perfect condition to insure adequate and constant current supply. At least once a week the ammeter should be checked against a standard ammeter.

Simple Apparatus for Pyrometer Checking

The procedure outlined above will do much to keep the pyrometers in perfect working order. However, to insure absolute accuracy they should be periodically checked against a standard. In the past it was the practice at Rochester as at most other coke plants to return the instruments to the manufacturers for checking. This procedure offers many objections in that it requires considerable time and there is a possibility of breakage or disturbance of adjustments in transit. To overcome these objections and provide a quick accurate and simple means of checking pyrometers a simple apparatus was developed by the electrical laboratory at Rochester.

Figure 1 shows the complete apparatus with the pyrometer in position for checking. Referring to the photo the apparatus consists of a comparison lamp house "A" in which is enclosed a specially designed comparison lamp shown in detail in figure 2. This lamp consists of a tungsten wire in which has been cut a notch enclosed in a vacuumized tube. The lamp was built by the National Lamp Co., of Cleveland, Ohio, and is quite inexpensive. "B" is a small lens necessary to focus the filament of the comparison lamp. "F", "F" are two slide wire resistances for current adjustment. "E" is a potentiometer. "C" is the telescope of the pyrometer being tested. "D" is the meter section of the pyrometer. Figure 3 shows a wiring diagram of the apparatus.

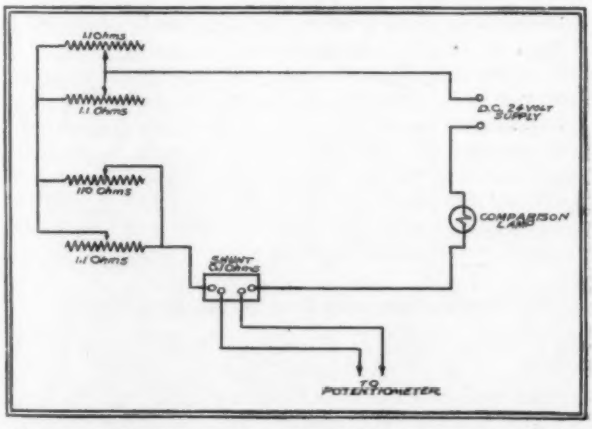


Fig. 3—Optical Pyrometer Test Table. Schematic Wiring Diagram

A calibration of current against filament temperature must first be made on the comparison lamp with a standard pyrometer which has previously been calibrated by the bureau of mines. This standard pyrometer is kept in the laboratory to insure its accuracy. A storage battery is used to furnish the current of from 10 to 15 amperes for the apparatus. The slide wire resistors are used for obtaining various current values while the potentiometer is used for adjusting the current to a predetermined value. The potentiometer in this apparatus is not intended to measure the current, but merely to indicate when the current has been set at a definite value. It is made up so that it can be set at a definite value and the current adjusted to this value. For simplicity the value to which the current is to be adjusted is given in degrees rather than amperes so that the test report merely shows the measured temperature and standard temperature.

To use the apparatus the operator selects the temperature value he wishes to measure and adjusts the current until the galvanometer shows no deflection. He then adjusts the lens to focus the filament of the comparison lamp. Next he sights the telescope at the notch in the filament of the comparison lamp adjusting the position of the telescope until the filament of the pyrometer lamp cuts the filament of the comparison lamp at the notch. He then "shoots the heat of the comparison lamp with the pyrometer. This process is repeated for several

various temperatures throughout the operating range of the pyrometer. The temperatures read are then checked against those previously read for the same current values with the standard pyrometer.

With this apparatus it is possible to check a pyrometer in a few minutes. By checking frequently the heater can feel sure of the reliability of his temperature measurements.

Flue Temperature Measurement

To insure uniform and safe battery operation it is essential that the heater know the maximum temperature reached by each flue and maintain a safe differential between maximum temperature and the softening temperature of the brick. It is generally considered that the maximum temperature which a flue should never exceed is about 2750° F. and it is strongly recommended that the temperature be kept as much as possible below this point.

The temperatures of one flue of each wall should be read by a competent man with a reliable optical pyrometer at least once every eight hours. It is obviously impractical to read directly the maximum temperature of each wall, which temperature is reached when the wall is burning just before the reverse takes place. However, it is possible to determine quite accurately this maximum temperature by reading the flue temperatures on the "off" or down burning walls at a certain specific time after the reverse has taken place after which the temperatures may be corrected by the use of a "cooling curve" to determine the maximum temperature, reached by the flues.

Determination and Use of Cooling Curves

In order to arrive at an average, "cooling curve" for a battery a large number of "cooling curves" for individual walls should first be determined and the average curve drawn by averaging the individual readings. The individual curves should be very carefully determined by reading at definite intervals of from two to five minutes the temperature of a flue on a wall during the entire heating cycle, starting at a reverse and including an upburning and a down burning period. For example, the operator will pick a certain flue of a wall, the "cooling curve" of which is to be determined. Assuming the wall is burning up he will have his instrument in readiness a minute before the reverse and at the exact reversing time take the first reading. It is very important that this first reading, which will be the maximum temperature reached in the flue be read at the second the reverse takes place as the change in a flue temperature during the first few minutes is very rapid. He should then read the flue temperature every five minutes during the "off" or down burning period until the next reverse takes place, at which time the minimum temperature is reached. The readings should be continued at the same intervals during the up burning period to the next reversing time, which completes the heating cycle. The values read should be plotted as ordinates against the time at which the readings were taken as absissa which gives the "cooling curve" for the wall. This same procedure should be repeated on at least every alternate wall. The values determined should then be averaged and the average curve plotted. Figure 4 shows an example of an average "cooling curve."

From the "cooling curve" the best time for shooting of the daily heats may be determined for the individual battery. Referring again to figure 2 it may be seen that when the wall is "off" or burning down the "cooling curve" flattens considerably at 10 minutes after the reverse. Between ten and fifteen minutes after the reverse there is a difference in temperature of only 25°. This time is therefore the best for accurate determination of the flue temperature for this particular battery. The temperature of as many flues as possible should be read during this period. From the curve it may be seen that the difference between the maximum temperature and the average temperature during the period of the reverse between ten and fifteen minutes after the reverse is 200°. Therefore by adding 200° to the flue temperature read during this period the maximum flue temperature may be determined.

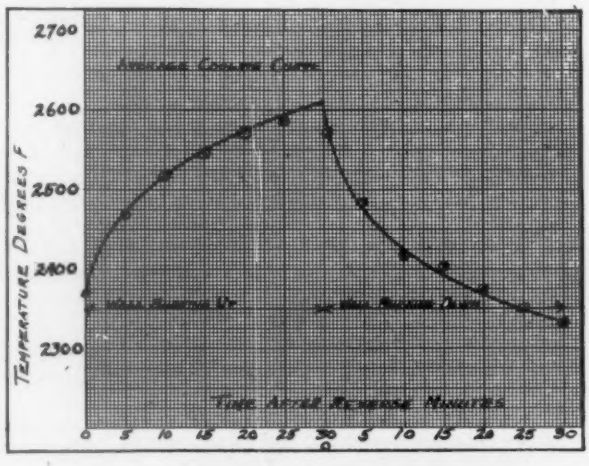


Fig. 4—Example of Average Cooling Curve

By following the procedure outlined the most desirable time for "shooting heats" and the correction for maximum flue temperature may readily be determined for any individual battery.

Draft Setting

For uniform and efficient heating it is very essential that uniform draft conditions be maintained on all walls. The draft setting should be checked at least once each month. A quiet day should be selected on which to do this work as it is impossible to obtain accurate draft readings on a windy day. The readings should be taken at the regenerator "peep" holes located at the top of the regenerators. A draft gauge of the Ellison type graduated in millimeters should be set up in the center of the battery and a rubber hose of sufficient length to reach to the end of the battery attached to the gauge. A piece of pipe about four feet long should be attached to the other end of the hose. The end of the pipe to which the hose is attached should be wound with asbestos rope which will seal off the "peep" hole when the pipe is inserted. When all is in readiness to take readings the gas pressure and stack draft should be normal and readings then taken on each of the down flowing regenerators. No readings should be taken during a reverse and at least two minutes should elapse after a reverse to permit balancing of pressures before reading drafts. Draft readings on the up flowing regenerators should then be taken. There should be a suction of about 1½ mm. or .06 inches at the top of each of flowing regenerator. It is very important that there be a suction at all times at this point. If a pressure condition exists and there is insufficient pressure in the oven

chamber to balance it, air may leak into the oven, combustion take place and fluxing of the oven floor result. There should be sufficient draft on the down flowing regenerators to give good combustion and the draft on individual walls should be very uniform with a maximum allowable variation from the average of .3 mm. or .012 inch of water.

If any walls are found to vary more than this amount the reason should be sought. Very often the heater is apt to correct a variation in draft by the easiest method which is to change the damper setting on the wall in question. However, this procedure usually does not correct the cause of the variation. It has been the writer's experience that usually a variation in draft has been caused by one of the following.

1. A leaky regenerator wall.
2. A leaky gas or air box connection to the wall.
3. Dirty gas nozzles resulting in insufficient gas to some flues.
4. Sliding brick out of place.
5. Coal gas leakage into the combustion chamber causing overloading of the flues.
6. A dirty regenerator.

At least once a year it is advisable to take a set of drafts at the bottoms of the regenerators as well as the tops. Such a set of readings will indicate stoppages in the regenerators, or bad leaks around the air boxes.

Regenerator Inspection

At least two times a week the regenerators should be inspected by looking through the inspection hole at the top of each regenerator. Excessively high regenerator temperatures over 2500° F. should be promptly corrected otherwise fluxed regenerator tops or sides may result. Hot regenerators may be due to any of several causes chiefly as follows:

1. Leakage of producer gas into the up flowing air regenerator or vice versa. This may be readily corrected by balancing the pressure at the top and bottom of the up flowing gas and air regenerator.
2. Excessively high flue temperatures may result in hot regenerators because of the inability of the oven walls to absorb the heat.

The excessively hot gases then overheat the regenerators.

3. Incomplete combustion of gas in the flues will result in unburned gas entering the regenerator where it may burn with the air drawn into the regenerator during the decarbonizing of the gas gun. This incomplete combustion may be caused by insufficient air, excess gas pressure, leaky gas nozzles or cracked gas guns.
4. Gas may leak from the oven into the regenerator where it burns with air from the decarbonizing of the guns.

Oven and Flue Pressure Balance

Perhaps one of the most important items of the oven heating operation is the maintenance of the proper balance between the pressure in the oven and the flue pressure. At several coke oven plants serious damage in the nature of fluxed floors has resulted because air has leaked from the regenerator into the oven where combustion has taken place. To prevent such an occurrence pressure should be maintained in the collector main sufficient to insure a pressure in the bottom of the oven chamber at the end of the carbonizing period. Usually 3 mm. or .12" will be found sufficient although this should be determined on each individual battery by drilling through several doors at the bottom and reading the pressure at various intervals during the carbonizing period. In addition a slight suction should be maintained at the tops of the upflowing regenerators at all times. Such a balance of pressures eliminate any possibility of damage to the ovens from this source.

Reversing Mechanism

The reversing mechanism is usually controlled and operated automatically by an electrical timing device, which due to its necessarily complex construction is apt to fail at times. The reversing operation usually takes place at thirty minute intervals when operating on slow coking time. On fast coking time a twenty minute reversing period is advisable to prevent high wall temperatures. To safeguard the oven brickwork from damage due to overheating it is absolutely necessary that each reverse take place regularly at the predetermined time. To insure the proper functioning of the reversing equipment it is advisable that a heater helper be employed. He should be required to observe the reversing of the machine at each reversing time and should check all cables, rods and dampers to be sure all have functioned properly. This procedure may seem unnecessary at times when all apparatus is functioning perfectly, however serious damage has resulted at several plants when the failure of the reversing machine to function was unnoticed.

The reversing machine is usually equipped with an air motor to be used in case of electrical trouble. This air motor should be kept well lubricated and should be operated each shift. It is also advisable to have available a chain hoist which can readily be used to perform the reversing operation in case of a broken cable or damage to the reversing machine. The importance of careful supervision of the reversing operation cannot be stressed too greatly. This operation should never be slighted regardless of the size of the plant.

Effect of Washing of Coal on its Carbonizing Properties

THE United States Bureau of Mines has been conducting research on the beneficiation of coal by various washing methods for a number of years so that a great deal of information has been collected as to the best and most economical methods for treatment of American coals. In a general way it is known that for practically any use to which a coal is put, it is improved by washing, but the extent to which it is improved for many specific purposes is not definitely known. For example, it is known that the presence of excessive mineral matter in coal intended for coke and gas making is detrimental, but the specific effect on the yield and quality of carbonization products has not been carefully determined. To obtain some definite information on this point a test is now in progress at the Bureau of Mines Pittsburgh Experiment Station, in cooperation with the Southern Experiment Station, Tuscaloosa, Ala., whereby the carbonizing properties of washed and unwashed coal from the same point in the coal bed will be compared. The coal will be tested under both low- and high-temperature carbonizing conditions and the yield and quality of all products of carbonization will be studied.

The Gas Producer

III-Conduction of Gas Producers Fuel Tests

JOHN W. ROMIG

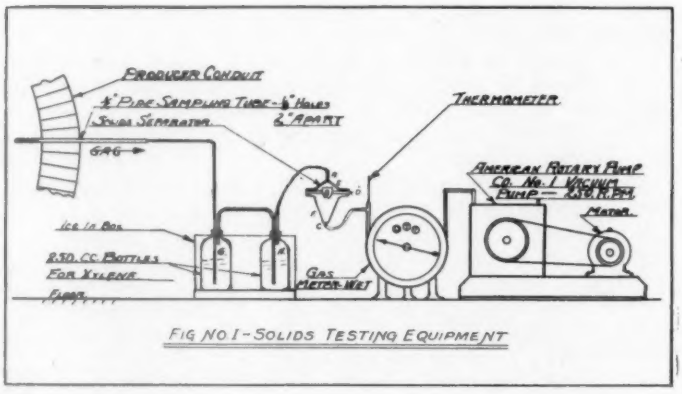


FIG NO I - SOLIDS TESTING EQUIPMENT

(Continued from December issue)

THE procedure for determining solids in producer gas is as follows: The gas is pulled through the wash bottles "G" and "H" which are filled half full with Xylene, a coke-oven by-product marketed under this name. From the wash bottles it goes into the special filtering chamber "I" which contains an alundum crucible. The direction of passage of the gas is indicated by the arrow in Figure I.

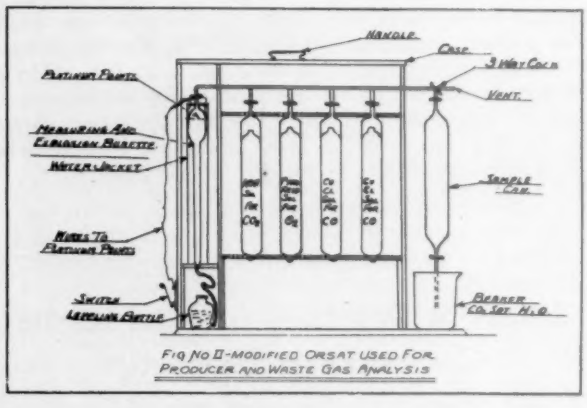


FIG NO II - MODIFIED ORSAT USED FOR PRODUCER AND WASTE GAS ANALYSIS

The work proceeds as follows:

The bottles "G" and "H" are filled half full with pure, dry Xylene. The alundum crucible "B" is ignited, weighed and inserted in the holder "D". The lid "E" is put on and fastened securely with bolts to the body "F". The holder "D" has a rubber gasket which holds the crucible "B" air-tight and also serves to seal the joints between the lid "E" and body "F". The inlet of wash bottle "G" is connected to the gas supply. The outlet of "G" is connected to the inlet of "H" and the outlet of "H" is connected to the inlet "A", the outlet "C" is connected to a gas meter. The gas meter in turn is connected to a vacuum. The vacuum is adjusted so that it should take ten to fifteen minutes to pass two cubic feet of gas through the equipment. It is preferable to insert wash bottle "G" in a vessel with ice. This will cause the water in the gas and volatile oils to condense in bottles "G" and "H". It will also keep the gas passing through the meter cool and at a fairly constant temperature. The temperature of the gas should be measured at the meter. In this arrangement, the oil, water and the most of the tar are absorbed in the wash bottles "G" and "H". Some of the suspended solids will be left in the bottles "G" and "H", the majority will be caught by the alundum filtering crucible "B".

After the two (2) feet of gas have passed through the meter, the filtering crucible "B" is removed from the chamber "F". The contents of the wash bottles "G" and "H" are filtered through the crucible "B" so as to retain in the crucible all the solid matter. The crucible "B" is washed with xylene until the filtrate is clear. It is then dried at about 145° C. and weighed. Then it is ignited and weighed again. The difference in weight will be carbon, which was suspended in the gas. The difference in weight of the crucible after ignition and the original weight of the crucible before using for filtering the gas will give the amount of inorganic matter or ash which are suspended in the gas.

The xylene solution is now put in a flask and the water which was condensed in the wash bottles "G" and "H" is distilled off and measured or weighed. This will give the amount of water vapor contained in the gas. The xylene is then distilled off until the residue from distillation gets up to a temperature of 145° C. This residue is weighed and this will give the amount of tar and heavy oils contained in the gas. The gas should not be passed too fast through the wash bottles "G" and "H", or otherwise, some of the xylene will be carried over to the crucible "B" together with some tar and clog up the crucible and hinder the proper functioning of the apparatus.

While drawing gas through them, the wash bottles "G" and "H" should be well cooled in ice. If it is impossible to cool both bottles, the bottle "G" should be cooled in ice and salt, or otherwise some of the xylene and tar will be carried into the crucible and even into the meter. The upper rim of the crucible "B" should be inserted in the holder "D" so that it will stick out of the gasket at least one-eighth of an inch and be very close to the inner surface of lid "E" as shown in the sketch, so as to prevent any xylene or solid matter from the gas to settle on the rubber gasket.

Orsat Apparatus

For producer gas and waste gas analysis the modified Orsat is used. The solutions for the modified Orsat gas analysis apparatus are made as follows:

Ammoniacal Cuprous Chloride Solution:—Put a layer of black copper oxide to a depth of one inch on the bottom of a one gallon jug. Make up a bundle of copper wires about one inch in diameter and place this in the jug. Fill the jug about three-fourths full with concen-

trated hydrochloric acid and shake well at intervals for an hour or so. Allow this solution to stand until cold before using. Take a small quantity of the solution and add ammonium hydroxide very slowly, stirring all the time during the addition until the light precipitate which forms is completely dissolved, and a deep blue color is produced in the solution. Allow this solution to become cold and note whether any crystals have separated. If so, add just enough ammonia to dissolve them. This solution is now ready for use and is to be used in the pipette for the absorption of carbon monoxide.

Potassium Hydrate Solution:—Weigh approximately 200 grams of potassium hydroxide sticks. Place the sticks in a glass vessel which will hold about one litre. Add 400 c.c. of distilled water and stir until all is dissolved. When this solution cools it is ready for use for absorbing carbon dioxide.

Potassium Pyrogallate Solution:—Take 200 c.c. of the above potassium hydrate solution and pour it into a beaker containing 10 grams of resublimed pyrogallic acid. Pour this immediately into the pipette reserved for this solution. This solution is used for the absorption of oxygen and should be made up fresh when needed as it absorbs oxygen very rapidly from the air. The other two solutions may be kept in stock.

The general procedures to follow in analyzing waste and producer gases are as given below.

Waste Gas:—After being measured in the burette the gas is passed into the potassium hydroxide several times. Unless the solution is very old, three times usually suffices (five times for safety). The decrease in volume gives the carbon dioxide absorbed. Readings are taken until the volumes become constant. This solution should last several weeks. The gas is next passed into the pyrogallate pipette. The shrinkage in volume gives the O_2 absorbed. Five or six times should suffice for the oxygen absorption when the solution is fresh. Be sure after each determination that no more absorption takes place. Carbon monoxide, or if oxygen or carbon dioxide are present, they will be absorbed by the cuprous chloride solution. The shrinkage in volume gives the carbon monoxide absorbed, if oxygen and carbon dioxide are not present. The gas should be passed in this solution at least 10 times and two readings taken after getting a constant volume.

Producer Gas:—After being carefully measured in the burette, the gas is passed into the potassium hydroxide several times. Unless the solution is very old, three times usually suffices (five times for safety). This solution should last several weeks and readings are taken until the volume becomes constant. The gas is next passed into the pyrogallate pipette. Five or six times should suffice for the oxygen absorption when the solution is fresh. Be sure after each determination that no more absorption takes place. Carbon monoxide is absorbed by the cuprous chloride solution. (The gas should be passed in this solution at least 10 times and two readings taken after getting a constant volume). The shrinkages in volume after completing absorption in each pipette gives the CO_2, O_2 and CO volumes respectively.

When all the carbon monoxide has been absorbed, the gas is then run back into the burette, measuring one-third of the volume. The remaining two-thirds are passed into the cuprous chloride pipette as a reserve. A sample can is now filled with oxygen and about 40 c.c. is drawn in with one-third volume of gas in the burette. The burette is closed after the volume has been read and the gas exploded. Open the burette stop cock and read the volume. The difference gives the contraction. Now pass the gas into the potassium hydroxide pipette in order to absorb any carbon dioxide formed by the combustion caused by exploding the gas. After reading, note the amount of carbon dioxide formed. Multiply the amount by three, which will give the percentage of CH_4 in the gas. The following calculation will give the percentage of hydrogen. The contraction, minus twice the carbon dioxide formed, equals three halves the hydrogen.

Contraction; $2CO_2 = 3/2\ H_2$

Example: Contraction ..... 9.6 c.c.
CO_2 ..... 1.6 c.c.

$3 \times 1.6 = 4.8\ CH_4$

$9.6 - (2 \times 1.6) = 6.4 = 3/2\ H_2$

$H_2 = 4.26$

Since one-third of the volume was taken, this result must be multiplied by three. $(4.26 \times 3 = 12.78\ H_2)$

When the crystals form in the cuprous ammonium chloride pipette, pour in a few cubic centimeters of ammonia hydroxide to dissolve them. Otherwise, the pipette may become clogged. It is a good plan for producer gas analysis to provide two cuprous ammonium chloride pipettes, as with high carbon monoxide percentages it soon loses absorption properties. The level bottle and burette should be filled with water saturated with carbon dioxide or with mercury.

Almost any fuel text or combustion text will give complete information on gas analyses. There are variations used by different chemists. It has been found in checking blank samples that the equipment, solutions and procedure shown above give accurate results.

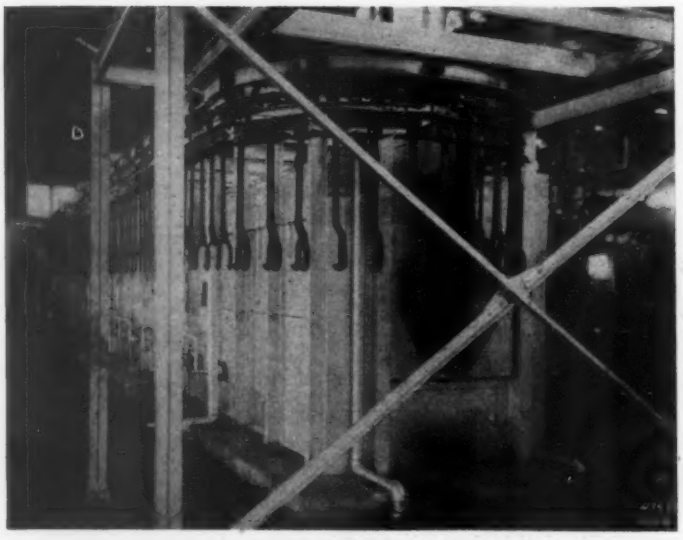
Trials of new fuels should be made occasionally; in fact, as frequently as fuel or freight costs change. It is often found as a result of tests that a higher priced fuel is the cheapest and most satisfactory fuel for producer gas. Tests made without systematic assembly of data and results may lead to false conclusions, so it is recommended that complete gasification data be secured for the normal fuel and all test fuels so that the results can be placed on a comparable basis. The present tendency is to purchase fuels on a first cost basis without operating information. How much this procedure costs industry is impossible to estimate but it certainly does cost far more than the costs would be if the results of fuel tests were the basis of fuel selection.

To the Vanishing Point

(*Continued from page 51*)

more company demands careful study of the six text units distributed issued by American Gas Association, but on the part of the student and group leader as well. Further, each man must answer a number of questions both in the class room and on forms to be sent into Association headquarters for rating and correction. Also, the management pays the expenses of the course where the same has been successfully completed. In view of such a status it is relatively simple to predict that this company will receive a splendid return of hearty cooperation from its employees and customers, because that is just what is happening now, although the course has been in effect but a short while.

Heat Treated Pipe Couplings Solve Long Distance Gas Transportation



Entrance End of Furnace showing empty Conveyor entering

C. B. PHILLIPS

Vice-President Surface Combustion Company

DUE to the recent awakening of the gas industry to the possibilities of conveying ever increasing volumes of natural gas to more and more distant markets, we have seen, within the past 2 or 3 years, a gigantic expansion in the natural gas pipe line systems of the country. Already these lines extend to 38 states and the present pipe line building program totals more than one quarter of a billion dollars. The energy from the natural gas consumed in this country last year is estimated to be equivalent to 527 billion kilowatt hours, or almost six times the total production of electricity during the same period. The line from Texas to Chicago will soon be completed and other long runs are being contemplated.

Many problems had to be solved before these longer lines could be built and one of these was that of stronger couplings, for the longer the lines, the higher the pressures required. The 1400 mile Chicago line, for instance, calls for working pressures up to 800 lbs. This problem was solved by S. R. Dresser Manufacturing Company, Bradford, Pa., whose products had already solved the previous coupler problems of the industry. This coupling consists of a middle ring, two flanges, gaskets and bolts to hold the assembly together. They have been in universal use in the oil and gas pipe line industry for a great many years.

Natural Gas Furnaces Installed

Already using the very best steels procurable the demand for greater strength was met by an extension to their plant with new and more powerful machinery at the cost of half a million dollars. Huge furnaces fired with natural gas fuel, continuous and automatic in operation, were installed. At the same time the plant was expanded, more lines of manufacture being added.

These lines, like the others, are of the progressive, straight line production type and the furnaces were simply put in at the proper points. Where hot forming was necessary, as with the flanges, two furnaces are used in tandem, the first to bring the blanks to forging temperature and the second for the reheating. These furnaces were designed and built by the Surface Combustion Company, Toledo, Ohio.

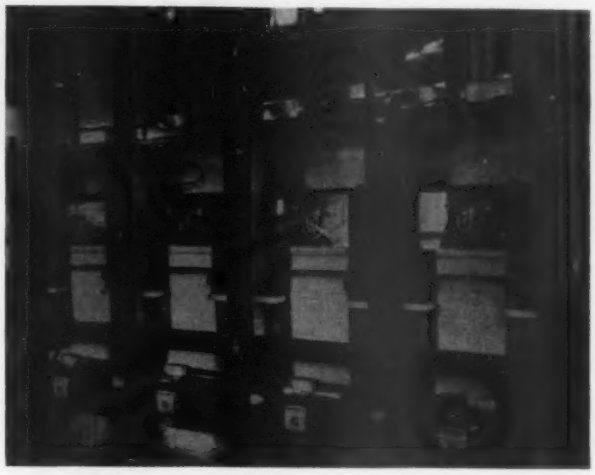
In the new flange department plate steel is brought in on industrial cars to the blanking presses, the resulting blanks for the larger sizes being 32 in. in dia. and ½ in. thick. These are charged into the loading end of the forging furnace and drop out automatically on to a gravity conveyor at the unloading end and are delivered hot to the forming presses. There are two formings which require two presses and the blanks are handed from one to the other by an operator with tongs and then dropped on to a gravity conveyor which takes them to the loading end of the heat treating furnace where another operator hangs them on to the conveyor. At the unloading end they automatically drop off on to another gravity conveyor and pass successively through a forming press, a quench and a bolt hole press.

Furnace Dimensions

This furnace is 42 ft. long, 3½ ft. wide and 4 ft. high from the hearth to the flat arch. The side walls consist of approximately 9 in. of fire brick and 4½ in. of insulation while the special suspended flat arch is constructed of special fireclay shapes and 6 in. of insulation. This flat arch carries, throughout its entire length, a narrow slot through which pass the alloy hooks suspended from the conveyor. The whole is encased in steel plates and the buckstays are carried to a sufficient height to give the proper support to the conveying mechanism.

This conveyor mechanism consists of an endless chain, operating in a water cooled track, suspended just above the furnace, and carrying alloy hooks which project down into the furnace, through the slot in the arch. One line of this endless chain is directly over the slot in the furnace arch while the other line is away from the furnace so that the hooks travel back to the charging end entirely outside of the furnace. There

is no loss of heat through this slot due to a series of short steel plates on the shanks of the hooks which form a continuous seal. The chain is stretched between two sprockets and the mechanism is driven by a motor through a speed reduction gear train.



Recorders used with Automatic Temperature Controller

The overall length of this conveyor is 66 ft. while the distance between the chain traveling over the furnace and the side moving exterior to the furnace is 6 ft. No door is provided at the entrance end as the opening here is made in the same size and shape as the blanks passing through. The fact that these blanks are quite close together and that this end of the furnace is designed for preheating only prevents the loss of much heat. When smaller size blanks are treated, the space is closed with specially made steel forms.

At the other end a side slot discharge is provided and a stationary stripper causes the blanks to drop off the hooks, as they pass by, into a narrow inclined chute, down which they roll direct to the forming press. The operating mechanism is provided with a reversing device so that in the event the forming presses are stopped for any reason, the entire charge can be quickly run out of the furnace before it is overheated.

Heating of this furnace is accomplished through the use of 26 wide range velocity type gas burners, firing below the hearth level in the heating zone. They are so arranged as to fire from both sides of the furnace and thereby provide uniform heating of the entire cross section. Gas is supplied at 25 lbs. pressure, this pressure being built up in a compressor provided for this purpose.

Automatic Temperature Control

The temperatures of this furnace are controlled with two automatic control pyrometers, supplied with recorders and connected with two mechanically operated valves in the gas supply lines. The operating temperature is 1750 deg. F. while the blanks are delivered to the presses at 1600 deg. F. From the second press they are returned to the charging end of the reheating furnace and placed on the hooks. These flanges enter the furnace already preheated for they still retain approximately 1200 deg. F. of heat.

The reheating furnace is similar in general to the forging furnace, the entrance being the same, also the unloading device and chute at the discharge end. This stripping mechanism is a special feature and serves to strip the hot semi-formed couplings from the hooks and deliver them to the chute in the side discharge opening.

The burner equipment is the same except that the burners are distributed over the entire length of the furnace. The temperature required, in this case, is 1950 deg. F., and is controlled as described. The steel disc that went through the first furnace has now been elongated to a maximum length of 3 in. on the flange. The maximum weight of each piece, disc or flange, is 67 lbs. Small discs, down to 15¾ in. in dia. and ¼ in. thick are also processed in this setup. The capacity of the unit is 18,000 net lbs. of work per hour (268 pieces).

The flanges are finished formed in a press close to the discharge end of the second furnace and from there they go by gravity conveyor, into the quench tank for hardening. This steel tank is 20 ft. long and 3 ft. wide and is equipped with a traveling conveyor which takes the work through and then lifts it out at the further end from whence it is put into another press and the bolt holes punched. This finishes the flanges.

Putting Gravity to Work

The layout for the middle ring consists of shears which cut skelp to the proper lengths and these pieces are formed to ring shape in a set of power rolls. The ends are then ground for grips and they are passed into flash welders where the joints are welded tight. They then pass through heat treating furnaces and are quenched. The feature of this layout is that, from the rolls on, the rings are delivered, or rolled from one process to the other along inclined runways. Even the furnaces are built long and narrow, with inclined hearths, so that they roll through, without any mechanical aid, and directly into the quench.

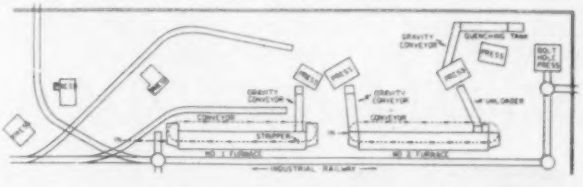


Diagram of Plant Lay-out

They are lifted out of the quench and put on to another series of runways that take them successively through the chipping department and three forming presses. Every ring is then submitted to an air pressure test. From the last press they are hung on to an overhead traveling conveyor which takes them to the cars or to the storage.

Every so often the parts for a complete coupling are taken directly from the lines, assembled and tested to 1600 lbs. air pressure under water.

Mechanical Revivification of Oxide Purifier Material

F. T. TURNER,

The Universal Sand Equipment Co.
Cleveland, Ohio

Long Distance Mechanical Handling is entirely feasible

AN item of great importance in the cost of gas purification has been the slow and expensive method of handling the fouled oxide. The commonly practised method of revivification is to take the material as it is dumped from the boxes, break up the lumps, and turn and pile the material by hand labor. Revivification is accomplished by the action of the oxygen in the air. This method has several disadvantages since the labor cost is high and the time required for complete revivification is long. This necessitates carrying rather large stocks of purifier material, plant investment is accordingly increased, and considerable storage space is required, often a handicap in the plant where yard space is at a premium.

Important savings in these costs can be effected by mechanical revivification of the fouled material. One very successful mechanical method is that of the Universal oxide conditioner. A brief description of this machine follows, together with some interesting data on the savings which its use has made possible.

The Universal oxide conditioner consists of an impellor assembly, rotating within a housing that is fitted with a special wear resisting, reversible, and replaceable alloy liner. The impellor assembly is fitted with replaceable and reversible blades, which can be conveniently changed. A steel intake hopper is mounted on the impellor housing, through which material is fed into the machine. Attached to the impellor housing is a chute, through which the material after passing through the machine is discharged. The position of the impellor housing outlet is adjustable to permit the material to be discharged and piled to suit conditions. The complete unit is electrically operated and is mounted on a heavy steel frame, fitted with wide tread roller bearing wheels and can be easily moved from one location to another. The construction is rugged throughout with no complicated parts requiring attention or costly replacements.

Easy Portability permits use at any desired point in the works yard

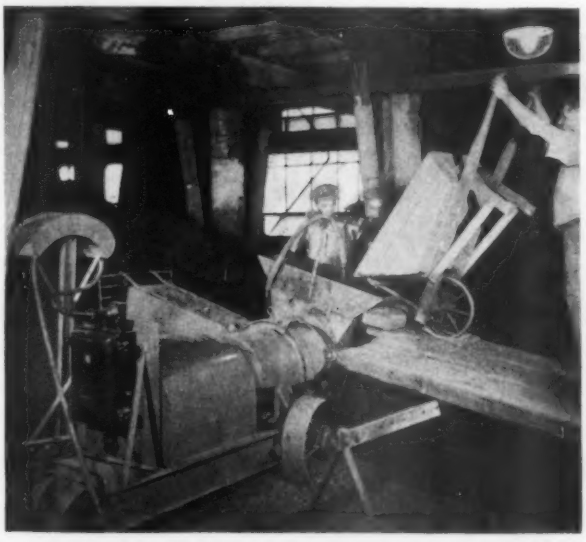
The operation of the machine depends upon the rotation of the impellor assembly within the housing and the impact action of the impellor blades on the oxide purifier material. This, with the centrifugal and blast effect developed by the rotating impellors causes the material to be discharged through the air into long rows or into piles. This action, together with the passage of the material through the air, introduces a maximum amount of air into the mass and greatly hastens the revivification process.

Savings Effected

The use of this machine results in several sources of savings. One of the most important is the elimination of labor. Where the material can be passed directly into the machine as it is dumped from a purifier box, practically no additional labor is required over that required for emptying the boxes. Portable loaders can also be effectively used in conjunction with the conditioner, enabling the material to be conveyed, revivified and piled at a cost amounting to little more than that of the power consumed in the machines.

One gas company, after making a careful study of the economies resulting from the use of the Universal conditioner found that savings were effected as follows: 10,000 cu. ft. of fouled oxide purifier could be put through the machine in 8 hours at the cost only of the electric power consumed. In the matter of breaking up lumps alone their saving was approximately $160.00 per 10,000 cubic foot batch, this being the difference between the cost of 360 man hours labor under former methods for breaking lumps alone and the cost of electric power to operate a 15 HP electric motor for 8 hours. Formerly subsequent simple hand turnings were required, costing about a third of the cost of the first turning. With the mechanical conditioner these subsequent turnings were eliminated. Usually one pass

through the machine is sufficient for complete revivification. Hence it can be readily seen that these additional economies at this plant would bring the total saving to between $350 to $450 per 10,000 cu. ft. batch. At another gas company the use of the machine reduced the labor required for revivification 75 per cent, and it is quite possible that with an improvement in the material handling methods, still further savings would be effected. These two reports cited, illustrate the possibility for savings in labor cost with this machine.



Indoor Purification in cramped quarters is equally effective

A second source of important saving over hand methods is in the rapidity with which revivification is accomplished. With hand methods considerable time is required to secure complete revivification. When the fouled oxide purifier material is passed through the conditioner all the lumps are completely disintegrated, and because of the blast effect developed and the discharge through the air, the material is deposited in light, fluffy piles, thoroughly aerated. Revivification takes place rapidly, often being completed in one day's time, a striking contrast with the long time usually required under the old method. Because of the reduction of time required for revivification, it is possible to considerably reduce the stock of purifier material usually carried on hand with a resultant reduction in capital investment. One user reports that it has been possible to reduce this stock 50%. Considering the cost of the material, this saving is well worth while and is of valuable assistance in lowering plant overhead expenses. A further advantage is that less storage space is required, an important point where yard room is restricted.

Another advantage in the use of the Universal conditioner is the increased activity of the material regenerated by this method. The activity of the oxide and its ability to remove sulphur from the gas is dependent on both the degree to which the material is regenerated and also the extent to which the lumps are broken up. The experience of users has shown that with the complete disintegration of all lumps, the material conditioned shows an increase in activity of fully 10% over hand conditioned material. It should also be noted that when the small lumps are not broken up, as is usually the case when hand methods are used, these lumps tend to roll to the side of the purifier box and to accumulate in one location, with a consequent loss in purification efficiency.

Outside Handling under the Purifiers often saves yard space

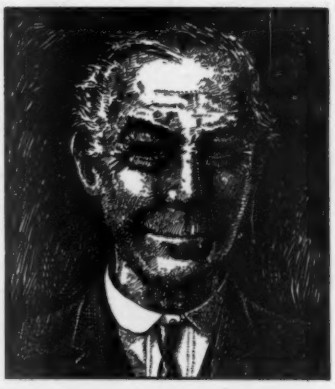
Summing up the advantages of the Universal Oxide Conditioner method of oxide purification, it will be seen that the greatest single source of saving is in the labor required for revivification. This in itself is sufficient to warrant the installation of the machine. The other advantages are more rapid revivification, reduced oxide stocks required, uniformity of the material, and better purifier efficiency.

Stocks of By-Product Coke On Hand at Producers' Plants, 1925-1929

(Table from U. S. Bureau of Mines)

Date	Furnace Plants	Other Plants	Total
January 1, 1925	606,313 tons	879,947 tons	1,486,260 tons
January 1, 1926	403,562 tons	251,005 tons	654,567 tons
January 1, 1927	641,866 tons	625,514 tons	1,267,380 tons
January 1, 1928	646,975 tons	1,167,256 tons	1,814,231 tons
January 1, 1929	768,554 tons	1,024,395 tons	1,792,949 tons
January 1, 1930	1,016,570 tons	1.157,353 tons	2,173,923 tons
November 1, 1930	1,311,437 tons	1,862,835 tons	3,174,272 tons

Letters from a Gas House Terrier to His Grandson



DEAR SAM:

In these so-called tough times, th' old joke about the salesman that's just ordered crackers and milk bein' not on a diet but on commission, aint so funny. But there's some of th' boys that ought to be not on commission but on th' farm.

Which observations comes from me settin' in your Ma's livin'-room lately nursin' the place where a jaw tooth had been, and list'nin' to what goes on around th' old homestead when th' men folks aint there.

In th' first place, son, I never knew before how many times a day th' door-bell rings these days. Your Ma had set out to get a mess of preserves put up that day, and th' hired girl was sore about that; and your Ma was sore because th' girl was sore; and me and th' cat was sort of tip-toein' around in consequence, when th' door-bell goes off like a three-alarm.

It's a' old guy with chin-whiskers, workin' his way through prep. school he says, takin' subscripshuns for three magazines; with a quart of motor oil and a combination scrubbin'-brush and breakfast food for a premyum.

By the time your Ma had told him No in all languages, includin' th' Skandinavian and two dialects from th' rear of th' Congo, somethin' had happened in th' kitchen, I gathered from th' way th' cat went by me with a tail that would have polished the inside of a six-inch pipe in transit through it.

Well, your Ma aint more'n cleaned up what boiled over on th' stove durin' th' interrupshun when it's th' phone this time! And somebody sayin' they's takin' a survey to determine how many slices of bread she was gettin' to th' gallon out of th' present-sized loaf. Of course, that wasn't nothin' but th' modern sales approach, keepin' down consumer resistance and keepin' up consumer dander by beatin' around th' bush while tryin' to locate th' prospect's self-interest complex before presentin' th' proposition. But your Ma aint up on all them scientific things, and she says it looked to her like a new way of bein' a damned fool. Them wa'n't her words, but that was th' impression th' sales-expert at th' other end had when th' wire quit sizzlin'.

All of which shows you somethin' of what th' housewife is up against. And—in her—what th' house-to-house salesman for th' gas company is up against, provided he don't take th' precautions to get himself out of th' Amalgamated Order of Bell Ringers and One-foot-in-th'-door Artists before he starts.

For, high up among their troubles, son, is that too many of 'em are still shootin' in th' dark; blunderin' along hopin' that th' old Law of Averages will be able to offset th' Law of Supply and Demand.

And, to prove that this aint no Hypodermic case, like th' lawyers call it, along durin' th' heat of th' day comes a future president of some big gas outfit. He wasn't much to look at, but I liked th' way he went at it. When he seen me cowerin' in one corner an' th' returned cat in th' other, he done what any good general had ought to do, he stopped to reconnoiter a bit.

"Is th' lady of th' house in?" says he to me, cheerful-like.

"And how!" I bursts into slang, as I will in moments of suspense or danger.

"You mean this aint a good day to approach her on makin' life easier for her around th' kitchen?" he asks, with a sort of twinkle in his eye.

"Son," I says, "I don't know you, but I do know women. And if I was you, I wouldn't approach that lady a' tall today. They's times and seasons—but this aint neither one of them. In fact, she's cookin' preserves, durin' which process six so-called salesmen has already interrupted her, and said preserves has boiled over and clogged up th' gas burners six times, 'til I don't like th' look in her eye."

But, instead of gettin' hep, he just seems to get cheered up. And he thanks me and starts down th' walk to his car. Then, a minute later what do I see but th' same boy comin' right back up th' walk again!

He don't come to th' front door this time, but starts around th' house to th' kitchen door, with somethin' in his hand. Well, I sort of liked th' look of him an' th' cut of his jib, so I'm willin' to do what I can: I goes out and moves two flower tubs so they won't slow him down none a little later, in leavin'. Then I opens th' hall door a mite, and cocks a' ear for th' crash. Th' cat gits under th' sofy. Cats is psychic that way!

But, would you believe me, nothin' happens! Not for some time. And then what I hears causes me to rub both my ears and give 'em th' blind-fold test for numbness in th' skull! For—believe it or not—th' boy is sayin':

"You sign right here, Ma'am; and I'll see to it, personal, that th' service department rushes it out here in th' mornin', in time for that next batch you're figurin' on—though I must say I've rarely tasted better."

Well, Sam, you can't teach a' old dog new tricks; but he can teach himself to keep his mouth shut when he's licked! So I never let on a thing when your Ma comes sailin' into th' livin'-room a little later with a kind of new happy light in her eye, and says: "Well,

th' next lot of preserves won't be so hard, praise be!"

And I says "Why?" And she says, "Because a young man come around to th' back door where I was —instead of yankin' me to the front door where he was—and he says 'Permit me, Ma'am,' and next thing I know he's shown me a new kind of gas burner that is all straight lines, instead of this spider-web style I've got that was impossible to clean quickly after things boiled over on 'em. He hit me just right, and I bought five of 'em!"

"You mean he's sold new burners for your old stove?" I muffs it.

"Why, Silly!" she says, "No! I mean I bought a *new stove* from him to get 'em! He's goin' to allow me somethin' on my old stove. . . . "

Well, I didn't say nothin' then, my mind bein' full of a lot of things. But I goes to the sofy, and looks under it, and "Move over!" says I to th' cat!

Yours for more headwork and less footwork in sellin'.

Monoxide Mike

Making a Success of the Small Company

How the Actual Selling Was Carried Out

A. A. WHITLOCK

General Manager, Piedmont Utilities Company

(*Continued from December issue*)

IT goes without saying that no gas company, regardless of how efficient a plant they might have or how attractive a display room, can prosper or even stay in business if the selling phase drags or is neglected. With this thought in mind the present portion of my article will deal with our company's actual procedure in getting appliances into the homes served by our distribution system and, what is more important, seeing that these appliances were used.

The merchandise on our sales floor was all marked up with the same percentage above cost. We of course did not use the same percentage in figures on the small appliances as we did on the larger and more expensive ones; the idea I want to convey being that we had one price only for each type of appliance. This price ranged somewhere around the list price but probably averaged slightly below the same. Gas refrigerators were held up to list prices. Incidentally, the salesmen were instructed that we had one price on merchandise for every customer and that there was to be no short cutting or favoritism shown.

The matter of trade-in value on old appliances which we removed gave us some little worry. This was due to the fact that we were not electric range or oil range folks and knew little or nothing about an old range of this kind. However, there was one thing we did know and that was that an electric or oil range was worth more to us sitting in our warehouse than was the profit on one of our gas ranges sitting on our sales floor. Therefore, in many instances we would sacrifice our entire profit and not infrequently cut into the cost of our gas range in order to get the prospect to use gas.

On numerous occasions where we encountered a good residential neighborhood with few if any gas appliances in operation therein, we have made an even trade of a gas range for an electric or oil range in order to get our gas service in a particular home where we thought we would receive the most helpful publicity. Such procedure of course assisted us in getting other customers in the same neighborhood.

As to our method of accounting regarding trade-in equipment, we proceed as follows. We set this trade-in equipment in our warehouse and do not even include it in our inventories. We include only the difference between cost and selling price, less the allowance made on the old equipment in our profit and loss item of merchandising. Hence the old equipment is ultimately net profit when it is finally sold, if our statement is carried out in this manner. Instead of a potential merchandising profit we have the satisfaction of knowing that we have an increasing number of gas meters working and bringing in revenue and in addition we have reduced the overhead cost of the plant by boosting our output.

In our first year of operation we have yet to show a red statement for merchandising and we have done better than $5000 per month in merchandising in this space of time. Further we have shown a good profit on our merchandising.

When the point is reached where a trade is so hard that it will necessarily be a sacrifice trade, the thing to determine is whether the opposing company is trying to do you or the customer. If it be the customer, let matters stand where they are; if it be an opposing company, get the trade at any price, as that is exactly what they are trying to do to you.

As an example, we had a case where we found an electric range sitting on the floor of one of our prospective customers' kitchen awaiting connection. When that company came, however, they found that the gas company had made a tap, ran a service, connected the gas range and had made money on the transaction. Incidentally, we took the electric range in trade. Again, one of our signed prospective customers who had not as yet been supplied with gas, advised us that the electric man had told him so much about the gas range that he was

really afraid of it and that he had bought and paid for an electric range and would not use gas. Thereupon we asked for a free 30 to 60 day demonstration, with not even the gas to be charged for. Bear in mind that this man had not yet allowed the electric range to be installed, but paid for it in full to the tune of $125. We placed an $85.00 range in his home on making this offer without having to give a demonstration and we traded even on the electric range. We then sent our truck to the electric company's salesroom and had our man remove the range and bring it to our office. One of their salesmen tried to buy it back from us after this, but we flatly refused and still have it among our souvenirs.

All of our salesmen have been instructed whenever they get up against stiff competition on a trade to turn this trade over to me, whereupon I make every effort to back up the salesman to put across the trade-in. In other words we make any kind of a trade as long as we can get a gas consumer, whether it is for an old range, coal, wood, oil, electric or otherwise. One humorous aspect of our activity in this direction has to do with one of our men who came in one day with a marble topped table that had been traded in on a gas range. Incidentally the salesman himself wanted the table and this was taken care of. At another time we traded in an automatic storage water heater for an Essex Coach. This auto ran for us and we felt that we got more than the value out of it before selling it for $25 to one of our laborers. The heater is still running and bringing in several dollars per month to the gas company.

Marketing Refrigerators

Our experience regarding the marketing of gas refrigerators was not only profitable but amusing as well. We can cite the case where we had installed a gas refrigerator in a fine home on approval and were later advised that the electric company had sold a refrigerator in one of the homes in which we had an approval job. We did not know which home it was, but immediately upon hearing the report we had every refrigerator user that was on our lines called on to find out who it was that was dissatisfied. We received an answer from all but three, and later found out that it was one of these three that said they had purchased a refrigerator from the electric company and had made their first deposit of $9.00 on the same and signed a contract. I personally visited this customer the next morning with our salesman. When we came away we had not only resold our own refrigerator but had sold a larger one and at no sacrifice. We really used common-sense talk, backed up by the fine printed matter gotten out by the Electrolux folks.

We had another case where the going was pretty stiff. The customer was undecided between a gas box and an electric one and I advised him that I would give him a free installation on an Electrolux for 30, 60 or 90 days or 6 months on one condition, that was that I would pay for water, gas and upkeep if he would induce the electric company to place the same size box alongside mine for test. The customer said the electric folks would not do this and on this basis the sale of the Electrolux was made.

Strong for Campaigns

We place considerable faith in special campaigns and in my mind they offer a fine method for putting any particular appliance into the home in numbers. In this connection we have put over what we feel have been some very successful individual campaigns. One of these was our first general automatic storage water heater campaign, which was started at a time most gas companies would probably consider as being off-season. However, we did not look at it this way and started the campaign on October 20, 1929, after three months and 7 days operation with about 300 meters in service, and ran it until November 20th. We used a broadside newspaper advertisement, followed up with a circular letter. We made an allowance of $10 for any kind of an old appliance that was being used for water heating, whether oil stove, jack stove, electric water heater or whatnot, the water heaters being held up to list price during the campaign. Before we were through with this sale, we had more oil, electric and coal heaters than it would take to start a junk yard and our final figures showed 55 heaters sold or better than 18% of the meters.

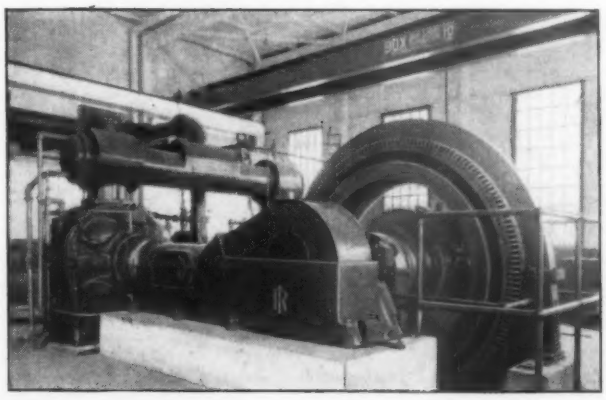
During this campaign we made an additional offer to all of our fitters, helpers, etc. whereby they were given 5% commission for each prospect turned in while the sale was going on and sold before it closed. This commission of course was only on the cash transaction and not on the allowance.

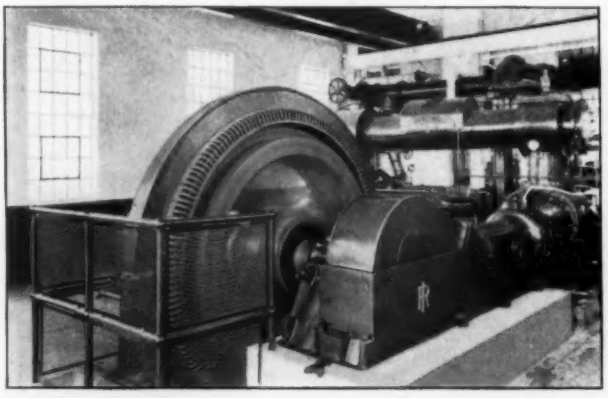
Another method that we find to be profitable is that during our range campaigns we frequently offer $10 to any customer who turns in a name that is a prospect and whom we can sell before the closing date of the campaign.

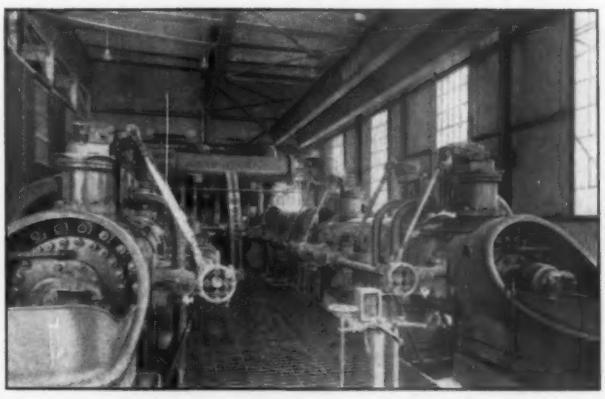
Throughout the month of May we had a big campaign on ranges and made this offer for the entire month. Incidentally, during this period the electric company conducted their annual cooking school and made a similar offer of $5.00 per name. We had several instances where a lady went to the electric cooking school and then came into the gas company office and turned in her prospects and collected her $10 per.

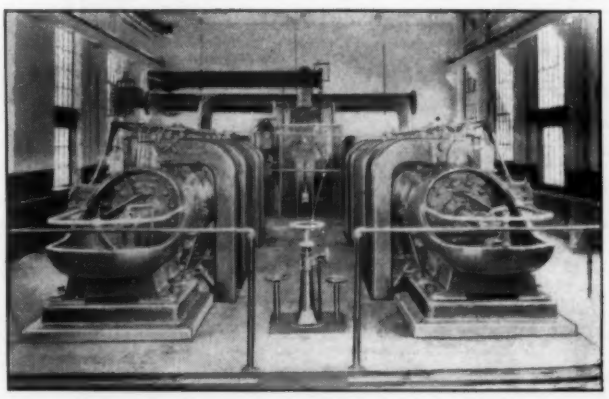
We have so much confidence in our ability to do the job right that we have a standing offer during the entire year whereby any appliance on our floor, excepting of course, heavy duty househeating jobs, can go into any reliable home on 30 days' approval. We find that this is one of the best offers that can be made because it is not only a courtesy but gives a clinching idea to the prospective customer that we have faith in our service. We have made very few removals on this basis.

Recent Gas Compressor Installations









We offer our experience gained in many gas compressor installations, including selection of the proper unit and complete design and construction of buildings, foundations and auxiliary equipment

THE U. G. I. CONTRACTING COMPANY
DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS
INCORPORATED
DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
112 North Broad Street

Chicago
Conway Building

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

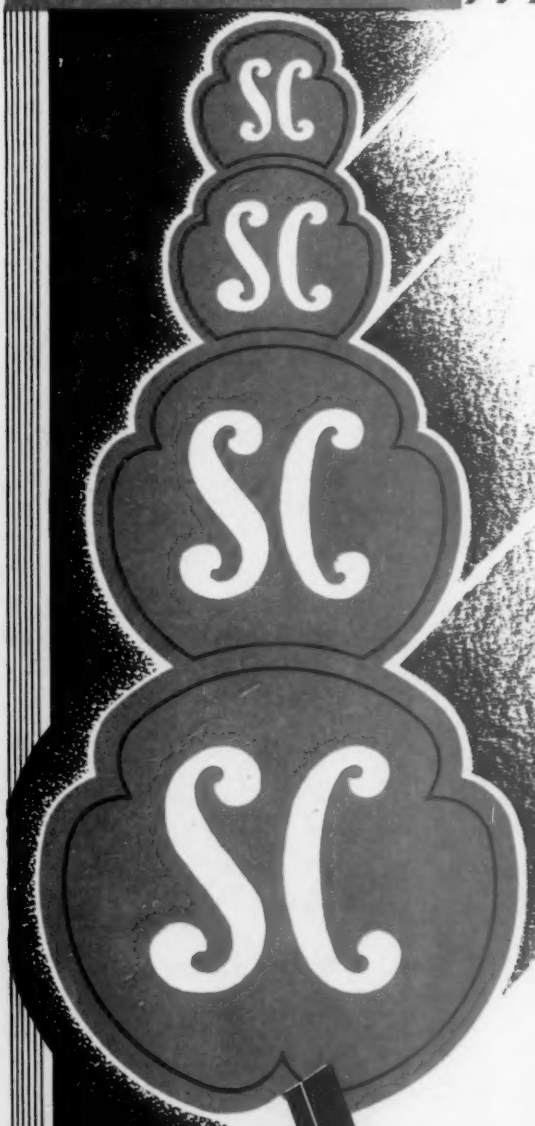
SURFACE

acquires the Gas Equipment Division of

THE COLUMBUS HEATING & VENTILATING COMPANY

Columbus Ohio

★



AGAIN WE EXPAND to Serve the Gas Industry *Better*

COMBUSTION

IN 24 MONTHS

Surface Combustion has added the following organizations . . . to strengthen its facilities . . . to broaden the scope of its service:

THE WEBSTER ENGINEERING COMPANY
Tulsa, Oklahoma
Industrial Gas Burners

THE MANTLE ENGINEERING COMPANY
Pittsburgh, Pennsylvania
Metallic Recuperators

THE CHAPMAN-STEIN COMPANY
Mount Vernon, Ohio
Roughing Mill Furnace Equipment

COLUMBUS HEATING & VENTILATING COMPANY
***Gas Equipment Division*, Columbus, Ohio**
Gas-Fired Domestic Furnaces and Unit Heaters

SURFACE COMBUSTION'S policy of judicious expansion . . . for greater service to the Gas Industry, is exemplified in this latest acquisition. ¶ The purchase of the Gas Equipment Division of The Columbus Heating & Ventilating Company adds high grade *complete gas-fired domestic furnaces and industrial unit heaters* to the existing SC JANITROL line of conversion units. ¶ The present Columbus line will be greatly augmented in styles, sizes and price range to meet the broad requirements of the Gas Industry. ¶ Sales activities will be national in scope . . . operating through fourteen district offices. ¶ This is another step in Surface Combustion's program of ever-widening service to the Gas Industry.

SURFACE COMBUSTION CORPORATION
TOLEDO, OHIO

Pipe Line Construction and Gas Distribution Work *at low cost*

COMPLETELY organized with equipment and personnel for pipe line construction and gas distribution work, we can efficiently and economically handle jobs of any size, from a few thousand feet of gas distribution main to cross-country oil, natural gas or gasoline lines of any length.

We will undertake the entire construction of a long line, constructing up to three hundred miles with our own organization and supervising and inspecting the construction of the balance.

We are experienced in the construction of lines through built-up and congested areas, and thus especially well qualified to install the tie-ins necessary when natural gas is brought into any locality.

All jobs are adequately equipped with the latest and most efficient labor-saving machinery and equipment.

The advice of our large force of consulting engineers—each an expert in his particular line of engineering and construction—is always available to our clients without cost.

All our work is done on the basis of actual cost plus a fixed fee as our compensation. Under this form of contract 100% of all savings revert to the client.

Because of our experience, adequate use of the latest equipment and our form of contract, we are building pipe lines and gas distribution systems at low cost.

THE U. G. I. CONTRACTING COMPANY

DIVISION OF

UNITED ENGINEERS & CONSTRUCTORS

INCORPORATED

DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
112 North Broad Street

Chicago
Conway Building

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

XVII- The Future of Gas Utilization

THE past several chapters have discussed the various phases that go into making up the commercial end of the present gas business. The besetting competition has been analyzed, the value and advantages of gas pointed out, and ideals set up for the installation of piping and appliances. The appliances too have been considered. The gas ranges have been dissected, water heaters laid bare, the mysteries of heating appliances blown away and the many other appliances in daily use paraded in their gala dress. It can be easily seen and unfortunately must be more readily admitted that much still remains to be done in domestic gas use. This refers not only to the education of the customer in the use of his present appliances but even more so in the introduction of those less favored appliances.

The substitution of the self action water heaters for the non-automatic heaters is greatly to be desired. The sale of radiant heaters which are used chiefly during the periods of low gas usage, the refrigerator with its low consumption and high load factor, the laundry equipment and incinerators absolutely off peak, need more and more thorough sales promotion and concentrated sales effort. The cumulative effect of these appliances on gas sales without enlarging services or meters is all in one direction, that of increased revenues and net income. The large volume consumption resulting from the sale of house heating appliances will undoubtedly be the most important single factor in the future rapid growth of the gas utilities. In some instances, plant expansion will be needed, but the increased revenues will not only reduce the fixed charges and overhead expense per unit volume sold, but also accelerate the rate of capital turnover.

Uniform Merchandising Plans Needed

The future of the gas business depends on well conceived uniform merchandizing plans and the introduction not only of improved utilization but also simpler methods of gas manufacture self sufficient in themselves. Modern standards of living have belied the hope that gas refrigeration was the summer balance wheel for the large winter peak. Refrigeration in winter is as necessary as in summer and the gas refrigerator operates at very nearly a uniform rate the year around. Along with gas refrigeration goes the thoughts of summer air conditioning for residences popularly called "house cooling". It is safe to say that heating and ventilating engineers are alive to the possibility of adapting systems in operation in commercial buildings to residences. Standards of heating comfort during cold weather are quite well established at 70°F. for people at ease or light work, but the limited application of cooling has been insufficient to set up any similar standards for cooling during the hot periods. A very definite trend is developing away from the excessively low temperature cooling to cooling by warmer but drier air, with the temperatures bearing some relation to the outside conditions, keeping if possible a fixed difference. As actual demand is created, gas fired systems of merit will be devised and available.

In the simplest terms, the use of house cooling resolves into two parts; removal of heat absorbed through building construction and drying the air which enters the building, by infiltration, through doors opening and closing and similar ways.

Examination of records of the Weather Bureau for the larger metropolitan cities shows that the average monthly temperatures during the summer are seldom over 75° and the average humidity slightly less than 70%. If then we set our comfort standard at 70°F. and 60% relative humidity for the average, a system will result which will not be large enough to cool to 70° and 60%, when the outdoor conditions are 95° and 85 to 90% humidity, but the resulting indoor air will be most refreshing and prevent shock when coming in or going out.

Calculation of Cooling Requirements

The calculations for a cooling system for transmission losses are exactly similar to those for heating systems. As an example, the calculations for a house in New York City can be carried out. The Weather Bureau records show the following normal temperatures and relative humidities for the summer months.

Month	Days Above 70°	Mean Temp.	Mean Rel. Humidity
July	31	73.9	68.7
June	7	71.4°F	67.7%
August	31	72.4	69.3
September	1	71.0	69.3
Total	70	72.9	...

Using these records as a guide, the annual fuel requirements for the cooling system can then be calculated.

Month	Days Above 70°	Mean Temp.	Excess Above 70°	Degree (Days cooling)	% Total
June	7	71.4°F.	1.4°	10	4.9
July	31	73.9	3.9	121	58.8
August	31	72.4	2.4	74	35.9
September	1	71.0	1.0	1	.4
Total	70	72.9	2.9	206	100.0

The degree day has the same significance as in heating calculations except that it represents the product of the number of days and temperature in excess of 70°F.

To make use of this data it must be converted to the basis of gas consumption per sq. ft. of radiation per sea-

son. As in heating the heat loss equivalent to a sq. ft. of radiation is 240 B.t.u. per hour which maintains a temperature difference of 70°. For other temperature ranges, the amount of 240 B.t.u. must be modified by an amount equal to the temperature difference divided by 70° or in the previous condition 2.9 ÷ 70. This in turn is multiplied by the number of degree hours in the cooling season or 206 x 24. The value so obtained is divided by the heat value of the gas used and the efficiency of the appliance which are assumed to be 540 B.t.u. and a test value of 34% respectively. Because of the heating effect of sunlight on walls and roofs, the resulting gas consumption is increased by 10%.

The calculation becomes then:

$$\frac{110\% \times 240 \text{ (heat emission per sq. ft. per hour for 70° difference)} \times \frac{2.9}{70} \text{ (ratio of heat absorption per sq. ft.)} \times 206 \times 24 \text{ (degree hours)}}{540 \text{ H. V. Gas} \times .34 \text{ (Eff.)}}$$

$$= 296 \text{ Cu. ft. gas per sq. ft. radiation per season}$$

This consumption is then multiplied by the radiation required for heat losses through walls, roofs, etc., neglecting those for air changes, allowances for prevailing winds or infiltration. If the former amount to 300 sq. ft. equivalent C.I.R. this part of the cooling system would use

$$300 \times 296 = 88800 \text{ Cu. Ft.}$$

Influence of Humidity

But cooling alone does not give the desired comfort, in fact, if carried to an extreme is is uncomfortable. Dehumidification or drying of air gives a better degree of comfort than cooling and when cooling is used to absorb the heat taken in through the building walls, roofs, etc., proves far more beneficial.

The calculations for heat required for dehumidification are a trifle more involved than for the simple heating or cooling. It is assumed that in an air conditioned home, one complete air change of outside for inside air will be made. The Weather Bureau Records already cited give the average temperature and humidity of the air. Reference to tables of properties of air and saturated vapor gives the heat content of dry air at various temperatures and the heat in the vapor needed to produce saturated vapor at those temperatures. For example, the heat content of 1 lb. of dry air (above 0°F) at 70°F is 16.90 B.t.u. and the latent heat of the vapor required for saturation is 16.61 B.t.u. The heat content, therefore, of 1 lb. of dry air saturated at 70°F. is 33.51 B.t.u. For air but 60% saturated or with a relative humidity of 60% the heat content of this mixture is

$$16.90 + .60 \times 16.61 = 26.87 \text{ B.t.u.}$$

Similarly the heat content of air of 71.4°F. and 67.7% relative humidity is 29.04 B.t.u.

To condition air of 71.4°F. and 67.7% humidity to the average desirable point of 70°F. and 60% humidity requires the elimination of

$$29.04 - 26.87 = 2.17 \text{ B.t.u.}$$

Quantities of air are measured by cubic feet instead of pounds and so these values must be converted to volumes by the use of proper factors. The use of 1,000 cu. ft. house volume is handy so the quantities of heat per lb. to be eliminated can be converted to heat content per 1,000 cu. ft. volume.

The following table is for the conditioning of normal air to 70° and 60% humidity for the period of the cooling season.

Month	Mean Temp. ° F.	Average Humidity	Heat Content (B.t.u.) Above 0° F. Dry Air	Saturated Vapor	Actual Vapor	Total	Excess Above 70° & 60% Humidity	Cooling B.t.u. per 1000 Cu. Ft./hr.	No. of Hours
June	71.4	67.7	17.24	17.43	11.80	29.04	2.17	158	168
July	73.9	68.7	17.85	18.99	13.08	30.93	4.06	297	744
August	72.4	69.3	17.48	18.04	12.58	30.06	3.19	231.5	744
Sept.	71.0	69.3	17.14	17.19	11.88	29.02	2.15	156	24

Total Cooling B.t.u. per 100 Cu Ft.

	26,600
	220,000
	171,000
	3,760
Total for Normal Season	421,360

The gas consumption per 1,000 Cu. Ft. house volume per season is, therefore for a 540 B.t.u. gas.

$$\frac{421{,}360}{540 \times .34} = 2300 \text{ Cu. ft. per 1,000 Cu. ft. house volume per season.}$$

Large size refrigerating machines available for this type service have given efficiencies of 34%. Hence the fuel consumptions are based on this result. As the art progresses, better methods will be utilized and the fuel consumption reduced in step with the increase in efficiency.

Two Angles of Approach

The heat requirements have been calculated on certain average conditions. A conditioning system built on these lines would be far too small to give adequate service. On the other hand, designing a unit for the worst weather would be improper physiologically and far too large for good all around operation. Two suggestions have been given serious consideration for the design of units, one based on reducing temperatures a maximum of 10° and humidity 10%, i.e., a system to maintain 70°F. and 60% humidity up to a point where the outdoor temperature is 80°F. and 70% humidity. When the outdoor air is warmer than this, the system operates continuously and gives conditioning both pleasant and in step with outdoor air.

The second suggestion considers 85°F. and 80% humidity to be a limiting condition and a desirable reduction to be one of 80°F. and 40% humidity. It can be seen that one suggestion combines cooling and drying to give comfort, the other relies more on drying of air to give the comfort. Comparison of the two systems by many people can alone give the solution to the most desirable condition.

As previously outlined, the systems can be designed according to the two bases. For the first a unit is needed capable of absorbing 620 B.t.u. per hour per 1,000 cu. ft. volume and 34.3 B.t.u. per sq. ft. C.I.R. of walls, roofs, etc. The requirements follow above 0°F.

Dehumidification

B.t.u. per lb. dry air at 80°F.	19.32
B.t.u. of saturated vapor	23.31
B.t.u. for 70% saturation	16.32
B.t.u. for mixture	35.64
B.t.u. in excess of air at 70°F. & 60%	8.77
B.t.u. to be eliminated / hr. 1000 cu. ft.	620

Transmission

$$\frac{240 \times 10}{70} = 34.3 \text{ B.t.u. per sq. ft. C.I.R.}$$

The second unit must be capable of absorbing 980 B.t.u. per hour per 1,000 cu. ft. house volume and 17.15 B.t.u. per sq. ft. C.I.R.

The requirements are:

B.t.u. per lb. dry air at 85°F.	20.53
B.t.u. of saturated vapor	27.51
B.t.u. for 80% saturation	22.01
B.t.u. for mixture	42.54
B.t.u. in excess of 80° & 40%	13.90
B.t.u. to be eliminated / 100 cu. ft. / hr.	980

Wall Transmission

$$\frac{240 \times (85-80)}{70} = 17.15 \text{ B.t.u. per sq. ft. C.I.R.}$$

Purely from the theoretical analysis, although it would seem that the unit designed according to the first thought would be smaller and give more continuous operation to agree with the demands of outdoor air, it is possible that the methods of design and construction of an appliance built for drying will accomplish more desirable results because of simpler and more effective dehumidification. Although appliances are now in the stage of house size research appliances, it is still too soon to even hint at the principles involved. More technical information is at hand or can be deduced about the cooling type unit and accordingly certain conclusions as to gas demand can be drawn. It is probable that the only field for conditioning units will be in insulated homes and therefore this will be the only consideration. The home is assumed to have a required radiation of 300 sq. ft. of which 220 represents heat losses other than glass and infiltration. A home of this size will have an approximate volume of 30,000 cubic feet. Hence the unit needed is one with a refrigerating capacity of 2¼ tons.

Transmission $1.1 \times 34.3 \times 220 = 8300$ B.t.u. per hour

Dehumidification $30 \times 620 = 18600$

Total 26900

One ton of refrigeration is 12000 B.t.u. per hour

$$\text{or } \frac{26900}{12000} = 2.25 \text{ tons}$$

At 34% efficiency the gas demand (540 B.t.u.) is

$$\frac{26900}{540 \times .34} = 147 \text{ Cu. ft. per hour}$$

The heating demand for this house is 270 Cu. ft. per hour or almost twice the conditioning demand.

Surveying Potential Field

With these basic principles as guides, it should be possible for the Sales Divisions to make an approximate survey of the potentialities of air conditioning. Past history and the present status of residence air conditioning indicates that only by thorough education and painstaking effort can the consumer be brought to a realization of the value of air conditioning. A fairly accurate census shows that at the end of 1930, only 12 residence installations of air conditioning, (all electrically operated) exist. The enthusiasm and initiative of the gas man must be continuous, far-sighted and contagious. A rough estimate of the use of gas for household operations would show that of the 21,000,000 homes in the United States, about 15,000,000 are supplied with gas service. In these homes, there are 13,200,000 gas ranges, about 7,000,000 water heaters, 120,000 refrigerators, 9,000,000 space heaters, and 455,000 homes are heated by gas with appliances other than space heaters; that is, by boilers, furnaces and circulators. Against this is the absolutely barren field of air conditioning. If 70,000 air conditioning units are in operation in 1940, the result will be a wonderful tribute to the persuasiveness of the household gas engineer. The rewards in the individual case are very worth while, but as a means of offsetting the tremendous winter peak this summer load will be trivial to a utility system.

An examination of the returns of a great number of Gas Companies with various rates shows that an annual average revenue of $45.00 is to be expected regardless of rate. Without a doubt this revenue will increase with the well directed sales plans, methods and endeavors of utility companies and appliance manufacturers until several times this return will be common. As an example of the possibility of gas usage, the following table is prepared for the insulated home previously considered as normal, that is one of 8 rooms and 2 baths and having a heating requirement of 300 sq. ft. of radiation.

	Cooking	Water Heating	Refrigeration	Incineration Laundry Drying	House Heating	House Cooling	Totals
January	2,000	4,500	1,200	2,500	61,800	.....	72,000
February	2,000	4,500	1,200	2,500	56,000	.....	66,200
March	1,800	4,400	1,300	2,500	48,600	.....	58,600
April	1,600	4,200	1,300	2,500	28,300	.....	37,900
May	1,400	4,000	1,400	2,500	9,000	.....	18,300
June	1,200	3,900	1,500	2,500	.....	7,500	16,600
July	1,000	3,800	1,500	2,500	.....	75,100	83,900
August	1,000	3,800	1,500	2,500	.....	51,000	59,800
September	1,400	4,000	1,500	2,500	600	1,400	11,400
October	1,600	4,200	1,400	2,500	15,700	.....	25,400
November	1,800	4,300	1,300	2,500	36,400	.....	46,300
December	2,000	4,400	1,300	2,500	55,600	.....	65,800
Totals	18,800	50,000	16,400	30,000	312,000	135,000	562,200

Even at a rate of 60 cents per M, the return of this ideal is well over $330. The comfort, convenience and livability of such a home makes an expenditure of this amount quite reasonable.

Much remains to be done in household gas utilization. Fortunately the industry has a past to which it can point with pride, a present of great activity and a future unequalled by any other branch of endeavor. The field is fertile, the prospects are receptive and the rewards high for the gas enthusiast alert to the many opportunities.

THE END

In response to numerous queries American Gas Journal is pleased to advise that the entire series, "Gas Utilization Technology for the Domestic Salesman," will appear in the near future in book form.—Editor.

Memphis Natural Gas Eleven Months' Sales Up 48%

MEMPHIS Natural Gas Company, 46 per cent of the common stock of which is owned by Appalachian Gas Corporation, reports sales for the eleven months ended November 30, 1930 of 8,047,711,900 cubic feet, compared with 5,410,087,373 cubic feet for the corresponding period of 1929, an increase of over 48 per cent. It is expected that when sales figures for December are compiled they will exceed a billion cubic feet for the month, due to the increased cold weather heating load.

Blind Lady Baking Pies

Real Dealer Co-operation

Successful Exposition of Latest Gas Ranges of Various Dealers

JOHN H. HARTOG

Manager, New Business Dept. Portland Gas & Coke Company

WHAT is perhaps a unique undertaking was the effort illustrated here, put on by the Portland Gas & Coke Co. in their large display rooms in Portland, Oregon during the month of November.

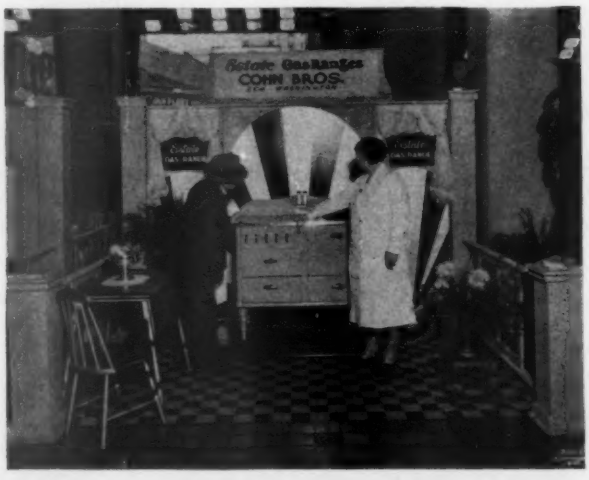
The idea of giving the dealers a chance to exhibit their ranges in the store had long been planned, but the question was how to get visitors to come and see the display. It stands to reason that there would be no object for women coming out of their way to see one gas range of each dealer in our display room, when they can see one or more almost daily in the show-windows of the dealers.

Moreover if they were interested in selecting a range, they would naturally go where the entire line was available.

Finally the idea evolved into a general "Dealers' Exposition of Modern Kitchens."

Of course, in engineering this exposition, we insisted

First Prize Winner



Second Prize Winner

upon it that the "pièce de resistance" should be a modern gas range.

We offered two cash prizes for the two best displays and arranged a ballot on which the visitors were to write their name and address and mark which range and which display they liked the best. The winner was the Powers Furniture Company, principally because they were near the entrance and had a very charming "French Maid", besides having a very attractive display of chinaware, flowers, breakfast set, picture on the wall, linoleum rug, etc.

At first the dealers did not feel that they could afford to furnish a saleslady and the places were rather dead. In order to overcome this, we offered to pay half of the expense, as each kitchen should have either a "French Maid" or "Young Housewife" who would be able to tell something about their range.

The second prize was won by the new Estate Range, exhibited by Cohn Bros.—a range on which a great deal of real ingenuity has been shown.

In order to make the Exposition more attractive, we had a Victrola going with soft Hawaiian music.

It may be noticed that the Portland Gas & Coke Company stayed out of the contest, although we had one extra booth for Tappan Ranges and one complete outfit as usual with a Smoothtop Gas Range, Electrolux Gas Refrigerator and Hoosier cabinet. These are shown where Katie Glanz, the blind lady is seen making pies. She was engaged in order to draw more women to the display room, as her ability to make pies is marvellous and the pies were in great demand.

Photographs in the Gas Industry

JOHN FLAHERTY

Photographer, Brooklyn Union Gas Company

PHOTOGRAPHS have many uses in modern business, as is exemplified by the work of this company. Included among the many divisions of the company which find photographs valuable to their duties are the New Business, Construction, Distribution, Claim and Laboratory Departments, as well as the branch offices.

As is generally known, the duties of these departments and their subdivisions are widely varied. Yet, the uses to which photographs may be put are so diversified that they are employed by all of these units to fulfill a demand which cannot be met as well by any other method. Thus we find them in use as sales allies, advertising media, records of installations, appliances and displays and for the identification of personnel. Other departments find other uses and at this point it is well to show just how and why they are used.

In the New Business Department the salesmen are equipped with loose leaf binders which contain photographs of the latest applications of gas in industry and the home. Since people are naturally visual minded and will more readily believe what they see than what they hear or read, it follows that prospects are more easily convinced by a photograph than by a prepared sales talk or by descriptive literature.

It is not entirely unknown that a salesman has exaggerated when "talking up" a proposition, nor for some sales literature to be misleading and sometimes erroneous. These factors have combined for years to create a bad psychological effect on the buyer which is difficult to overcome. However, show him a photograph illustrating the particular article under discussion, or one which points out its application to his problem, and much of the difficulty is removed.

It is a known fact that "pictures tell the story better than words." It is equally true that "photographs tell the truth." With these bits of psychology to help him, the salesman, armed with his file of photos is generally successful to a greater degree than are his brethren who depend entirely on the older methods of selling.

Photographs are also used as advertising media, a number of this company's newspaper advertisements being supplemented with illustrations which have been prepared from actual photographs. Likewise, the advertisements appearing in the various trade journals are so illustrated as are the numerous articles which appear in the magazines and periodicals to which the Publicity Division contributes.

The use of photographs for these purposes gives to the company a method of presenting the unique and admirable qualities of gas as a fuel in a manner in which these qualities can be best appreciated, namely, by seeing them.

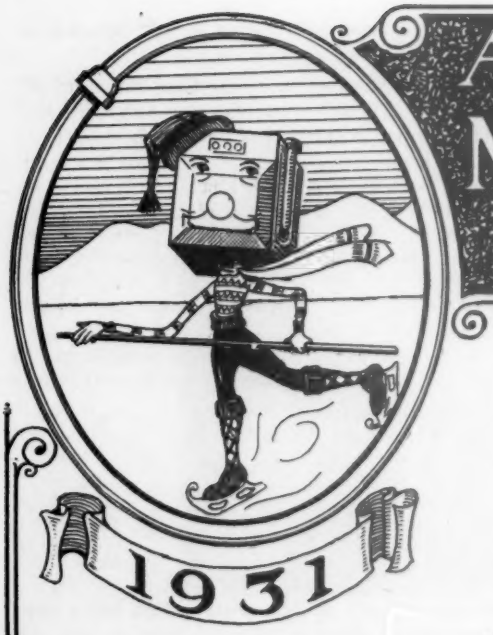
However, their use in selling and advertising, while very important, is not their only purpose. They are used as records in many of the departments, particularly in the Construction Department where a complete pictorial record of this unit's activities is maintained. Whether the work of this division be new construction, demolition, or repairs, photographs are invariably made covering the complete undertaking from its beginning to its completition. These photos are invaluable in following "progress" and in revealing to the eye immediately what blue prints and charts reveal to the imagination after a prolonged study.

The Distribution Department, through its subdivisions, utilizes photographs for a variety of purposes. It pictures its many types of vehicles from the smaller passenger car to the largest truck. Meter settings are studied and improvements worked out by the aid of photographs. Servicing methods are likewise studied and improved with their help.

At present it is proposed to use photographs to locate the valves which are placed in the street near the numerous by-passes made necessary by subway construction work. As these valves are often hidden from view by an accumulation of dirt and snow, it is felt that a photographic record of their locations would be of the utmost importance in an emergency when it might be necessary to dispatch a crew to shut off the gas. The men would lose no time tracing because by glancing at the photograph they would know exactly where to locate the valve they sought.

Besides the uses already enumerated, photographs are invaluable in personnel work including employees' portraits in the records division, identification cards and chauffeur's licenses. They are also used for the lantern slides in educational work, lectures and sales demonstrations.

—Courtesy The Weekly Bulletin



AMERICAN GAS MERCHANDISING ALMANACK

February

FEBRUARY finds the gas man all set to do some real constructive selling this year. During the past twelve months he has had ample time to cut stocks down to the next-to-nothing point; he has had time to utilize his hind-sight and to plan for the future in a manner that heretofore he thought was foolish. He has learned the value of sales forecasts, the value of budgets and stock control. February finds him rarin' to go.

In our February Almanack will be found twenty-eight entries for the month set down with the hope that they will provoke ideas for merchandise sales, for store and window displays, and for special tie-ins with special days of celebration.

We are also offering on the following pages several sales plans worked out in such a manner that they may be employed by the gas man who has two or two hundred salesmen. Gas heaters should be sold during February in order to clean-up the stocks of that item and gas heated dryers should be pushed for several reasons; one being that they are an item that every home manager needs and wants, another that it is a load builder that has not been given the publicity that is due it. Now turn to the plans we suggest, use them as laid out or remodel them to suit your particular set-up.

You will get business in 1931 if you'll go after it. Do not let down on your advertising. Approved appliances are good merchandise and gas is the fuel of the future. If the gas man will stand back of his convictions and shout them from the roadside folks will buy his wares,—remember the old mouse trap maker had to come out of the woods.

1—Sun.	**Run first Advertisement.** Victor Herbert celebrated musician born, 1859.
2—Mon.	**Go over store and window display. Ask folks to buy. Go over sales points with salesmen at morning meeting. Display advertisement in store at cashier's window.**
3—Tues.	Ex-President Woodrow Wilson died, 1924; Horace Greely, journalist born, 1811.
4—Wed.	**Run second newspaper advertisement.**
5—Thurs.	Rembrant Peale, Wm. Lorman, Jas. Mosher, Robt. Cary Long, Wm. Gwynn and others incorporated the Gas Light Company of Baltimore, 1808.
6—Fri.	Massachusetts ratified U. S. Constitution, 1788.
7—Sat.	**Chart sales for week,** Chas. Dickens, novelist born, 1812.
8—Sun.	**Run third sales advertisement.** Gen. Wm. T. Sherman born, 1829.
9—Mon.	U. S. Weather Bureau established, 1891. **Shape up plans for special Lucky Friday sale.**
10—Tues.	Canada ceded to England, 1763; William Allen White, journalist born, 1868.
11—Wed.	**Run fourth advertisement in dryer-heater sale or announcement ad in Lucky Friday sale.** Daniel Boone born, 1735; Thos. A. Edison born, 1847. **Build special Emancipation Window Display.**
12—Thurs.	Lincoln's Birthday.
13—Fri.	**Lucky Friday or Friday 13th. Sale opens. Arrange special for St. Valentines Day.**
14—Sat.	St. Valentine's Day; Oregon admitted as a state, 1858, Arizona admitted as a state, 1912. **Re-arrange store and window display.**
15—Sun.	**Run Fifth ad in heater-dryer sale.** U. S. Battleship Maine sunk, 1898.
16—Mon.	Ft. Donaldson surrendered, 1862.
17—Tues.	First Telephone exchange opened in California, at San Francisco, 1878.
18—Wed.	**Run sixth advertisement on special sale.** Ash Wednesday. Lent begins. **Offer special Lenten menus to every one phoning or visiting office.**
19—Thurs.	Phonograph patented, 1878; Ohio admitted to Union, 1803.
20—Fri.	Mary Garden, singer, born, 1877; Joseph Jefferson born, 1829.
21—Sat.	Washington Monument, Washington, D. C., dedicated, 1885. **Special Washington decorations in store and window.**
22—Sun.	Washington's Birthday; Rembrant Peale born, Bucks County, Pa., 1778. Run seventh advertisement on special sale.
23—Mon.	Battle Buena Vista, 1847.
24—Tues.	Vincennes captured, 1779, Denver gets first telephone exchange, Denver, 1879. **Use telephone to develop prospects.**
25—Wed.	**Run Final advertisement in special sale. Use telephone to close leads. Go over plans for March sales.** First industrial Lighting with gas in cotton mill London explained in paper read by Wm. Murdoch, before Royal Society, 1808.
26—Thurs.	Buffalo Bill, pioneer, born, 1846. **Use telephone to close prospects or to secure interview for salesman.**
27—Fri.	Henry W. Longfellow born, 1807.
28—Sat.	First railroad chartered, 1827. **Check over plan for March Sale. Have store re-arranged and window displays put in. See that all store and window lamps are clean. Go over details with sales force and place advertisement for Sunday newspapers.**

Selling Laundry Equipment

FOR every gas man who has an idea, a reason why plan, to aggressively merchandise a wanted home appliance or one that is not well known, there will be found ten others with a ready offer of reasons why it can not be done.

Gas heated clothes dryers are one of the items in the gas man's catalog that have not been given a fair break; that have been subjected to the "can't be done" without a struggle.

LEADING HOSPITALS
dry, sterilize and bleach linens, uniforms, etc., this QUICK, CONVENIENT WAY · · ·
In the modern hospital the advantages of fresh, sweet-smelling, thoroughly sterilized linens, blankets, uniforms, etc., are fully recognized. To obtain the desired results, many hospitals have equipped their laundry-rooms with Lamneck Clothes Dryers.
Lamneck Dryers enable these institutions not only to dry large quantities of laundry almost as fast as the pieces can be washed, but to do a thorough job of sterilizing and bleaching as well.
The rapid absorption of water which occurs within the dryer makes for a softness and whiteness not possible to obtain by any other drying method. By allowing the pieces to remain in the dryer for a short time after they are dry, all germ-life is destroyed.
Why not apply hospital standards of sanitation to your own laundry drying? A Lamneck Dryer costs less than most washing machines, and this first cost is soon offset by savings of time, labor, and clothes. It is a worthy companion to your washer and ironer . . . a source of great convenience and better results.
$5.00 DOWN
LAMNECK CLOTHES DRYER
Approved by Good Housekeeping Institute
THE GAS COMPANY
COLUMBIA SYSTEM

How Columbia Does It

The clean clothes problem has been the bane of the home manager's happiness from time immemorial. First, the problem of freeing soil from clothes arises, then in turn, comes the problems of getting them dried and ironed, and ready for wear. Three problems that the gas man may solve, yet does not.

Why? Let's see!

Women will welcome his aid, yet he rarely offers it. Again, why? For the simple reason that he has assumed that gas heated washers, dryers and ironers lack, what some sales managers playfully refer to as "customer acceptance."

That's the bunk! Women will purchase any and all of these appliances in goodly numbers if they are approached in the proper manner and are made aware of the fact that such home helps exist. The home manager may not respond to an appeal to purchase a tub mounted on a batch of wheels and a motorized post that turns both ways, or a box built of rust resisting what-not-coated-iron and a thermostat, or a porcelain shoe and a folding apron, but she will welcome and pay out good greenbacks for an appliance that will aid her in solving a household problem in a laborless and efficient manner.

Taking out of the picture the fact that the washer folks have done a good job of selling the idea of the home laundry, let's scrutinize the next problem confronting the home manager;—the drying of the fabrics after the soil has been removed. Here is where the gas man should step in and tell her how gas can be used to solve that problem most effectively. Here is the "why" for the consistent merchandising of gas dryers.

To sell gas heated laundry dryers we have to start from scratch in most cases and for a period of time, depending on how effectively we exploit the dryer, be content to play ball even when it may appear to be a losing game.

Home Manager in Ignorance

The home manager as a rule is not aware of the existence of such an appliance as a gas heated clothes dryer. Therefore, there exists in her mind no desire to possess one. This being the case, our job is first of all, one of introducing the appliance. Just how we may do this depends upon the attitude of the management of any particular property that is desirous of securing the load that the dryer offers us. If the management is of the "go-get-'em" type, the type that promoted the gas range, they will either employ a special man, on a flat salary basis, to introduce and sell dryers or they will place special bonuses on dryers and offer them as another item to all sales people, with the understanding that they expect them to be sold.

In either event they will supplement and back-up personal selling with a strong advertising campaign to sell the advantages of gas for the drying of home laundry. This advertising will be in the form of newspaper, window and store advertising and direct-by-mail advertisements sent to a picked list of customers and will be followed-up by the salesmen.

The price and terms offered the customer will depend upon company policy; some companies offering special advantages to the users and some passing on special concessions in the form of prizes, special employee prices and bonuses to employees, who may become interested in promoting the sale of the appliance.

Both plans mentioned are being employed by different gas companies and while they are doing business, dryers in but few instances are being sold to the extent that they might be if just a little more thought were given to the existing market for such an appliance.

Well over fifty per cent of the operating (merchandising) gas companies display and offer dryers for sale and as a wanted item of home appliance the dryer is showing a very rapid gain. This is due not to any consistent plan of pioneering, except for a few cases, but to periodical activities on the part of a few companies.

To gain widespread acceptance of dryers consistent and concerted effort should be planned, using as a basis one of the plans outlined and concentrating all effort on a picked list of potential users.

This prospective list of purchasers may be made up by personal field surveys conducted by the special dryer man or by the regular salesmen in co-operation with meter readers and service men. It should include everything from the so-called "two-car family" to the average family, apartments and institutions. Cards should be made up for each prospective purchaser showing the class of home, literature sent and calls made with the results of calls and the date for call-back. No prospect should be considered dead until he either purchases or moves. When a sale is finally consummated and the dryer is installed it should be the duty of the salesman to call upon the purchaser and make sure that the dryer is operating properly and that the user is thoroughly conversant with its operation. This call-back after sale will prove most beneficial for both the gas company and the salesman; it will assure the customer that the company is not only interested in a sale, but that it wishes the customer to be perfectly satisfied that it has his interest at heart. It will provide the salesman a very good opportunity to build a customer relation that will be of value when he has other merchandise to sell or when he needs prospects for dryers.

there's a silver lining
behind that washday cloud
Indoor
Laundry Dryer..
Use it for thirty days' Free Trial!
End forever the washday grievances that often come to clothes left to the mercy of the elements on an outdoor line.
This modern convenience—Indoor Laundry Drying—brings washday to a speedy and pleasant end. Clothes are dried spotlessly, beyond reach of flying soot and dust. 60 feet of indoor drying space is a year 'round convenience that you will appreciate especially during stormy washdays. Give it this trial and save your washday energy!
NO HAVE FREE TRIAL
There is no obligation whatever. At the end of the trial period, if, for any reason, you are not convinced that the Indoor Gas Laundry Dryer lightens and speeds up washday, we will remove the appliance without question of embarrassment. A down payment of $10, and 18 months to pay for it out of income, is the easy payment offer by which you may enjoy this convenience for all of your washdays to come. Mail the attached coupon today. It is in no sense an order and will not obligate you in the slightest.
60 LBS. DRIED IN AN HOUR
NORTHERN UNION GAS CO.
CENTRAL UNION GAS CO.
BRONX GAS & ELECTRIC CO.

A Good Ad

Another thing that adds materially to the sale of dryers is for the company to make special offers to employees who may be induced to purchase and use dryers. Employee-users prove to be very good sales aids of any appliance and aside from making the employee a special offer of purchase, many companies have found that it is highly profitable to offer employees a bonus for every prospect turned in by them when a dryer is sold by a regular salesman in a certain period of time. These offers are usually made during an intensive drive and are in force for from thirty to sixty days.

Another company offers dealers a co-operative year 'round plan. This plan offers dealers an opportunity to display and sell dryers and make no stock investment and in some cases even goes so far as to carry the account when approved by the credit department.

The dealer plan may be developed and broadened in many ways, depending upon the size of the city and the attitude of the management to such plans of cooperative selling.

It is understood that a number of gas companies will push the sale of dryers during 1931, opening with a spring drive of from thirty to sixty days and carrying-on by active effort on the part of the regular or special sales men until early fall when another special activity will be staged for a like period.

Dryer advertisements that we have seen are as a whole striking in that they picturize and talk of the drying problem and how well the dryer will solve it. The advertisements we are reproducing herewith are very good examples of the type of advertisement that have been used. They may be termed "The What I Will Do For You Type" and the type that we believe best suits the advertising of gas appliances.

Women, institutions and the manufacturer have come to regard the merchandise sold by the gas company as "right," dependable; they know that it is good merchandise, fairly priced; they understand that if service is required they may have it—yet withal, the thing that gets their names on the dotted line is "what it will do for me."

That's true of dryers or any other item that we sell and is worth remembering when you decide to push dryers over the top this spring.

Build your campaign around "what the gas heated laundry dryer will do for you"; sell the home manager the idea of sure, sterile, snowy-white drying no difference what the weather and you'll sell her a gas heated laundry dryer.

Selling Space Heaters

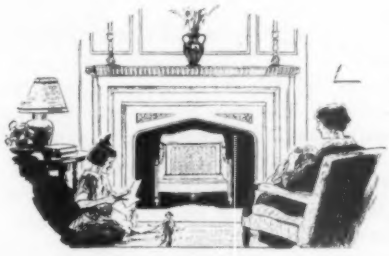
A SALE of portable and fire place heaters staged by one company was built around the idea so often used by department stores; that of a Stock Clearance Sale. This company went over their heater inventory and worked out an exceedingly low price on all heaters in stock. The price was set so as to make a quick turn-over in a thirty day period. A time price was quoted as well as a cash price in all advertising, the time price being fifteen per cent higher than the cash price. The payments were spread over four months. This was done to insure against reverts in case of an unseasonable warm spell in early spring.

This company used quarter pages in the daily newspapers to announce their sale and followed them up with three column, one hundred and fifty line advertisements each Wednesday and Sunday, throughout the sale. Sales people were given a bonus of one dollar on every heater sold during the sale. Special store and window displays were used throughout the month and both store display and windows were changed every ten days.

Another company that staged a successful heater sale used both newspaper and direct mail advertising to put over the sale. This sale featured the "Fifty Cents a Month Rental idea" as may be seen from the broadside reproduced on this page. The return card was a government paid postal card. The broadside was printed in red and black.

The rental idea was to deliver and install the heater on a rental basis, with the understanding that the customer might apply the rental to the purchase price of the heater at any time. The argument used was that the heater would pay for itself in the matter of fuel saving on mild days and in providing comfort to cold rooms and rooms that could not be made comfortable

by the regular heating system. Another play was made on empty fire places and, this also was responsible for the sale of many heaters.



To Give You
EASIER HEATING
WARMTH and COMFORT
MONEY SAVED
A SPECIAL RENTAL PLAN

Here is our special and unusual offer to you—which means a great deal in comfort and economy. Do away with the trouble and expense of running the furnace in those spring and fall days when you only want enough heat to warm up the rooms—or take off the chill on cool evenings. And in coldest winter, what a pleasure to have that extra warmth you need without forcing the furnace and wasting fuel.

These advantages are all yours—and this is the plan:

WE WILL INSTALL, IN YOUR FIREPLACE, THE POPULAR "No. 31" HUMPHREY RADIANTFIRE, AND IT WILL BE YOURS TO USE AND ENJOY WITHOUT BUYING —YOU CAN KEEP IT ON A SPECIAL RENTAL PLAN FOR ONLY FIFTY CENTS A MONTH. NO BOTHER TO REMEMBER—WE CAN PUT IT WITH YOUR GAS BILL. A DOLLAR BRINGS IT TO YOU AND TAKES CARE OF THE INSTALLATION.

Over a million RADIANTFIRES now in the homes of satisfied users testify to warmer rooms and smaller fuel bill. Join this great family—and make these same benefits yours.

Only **50c.** *a month*

—and here's what you enjoy

ALWAYS READY—no matter what the weather you can be comfortable.
INSTANT HEAT—at the stretch ofa match.
EASILY CONTROLLED—a twist of the wrist and your heating work is done.
ADDS A TOUCH OF BEAUTY TO THE ROOM—makes the fireplace glow.
CLEAN HEAT—no ashes, no odor, no dust—means easier housework.
PAYS FOR ITSELF through fuel savings alone. You use heat down the furnace works earlier in the spring and more is lost in the fall.

Northern Indiana Public Service Company

SEND IN THIS CARD NOW—
and enjoy money-saving heat sooner

Temperature Control in Automatic Refrigerators

PROBABLY the most misunderstood term pertaining to any automatic refrigerator, is that which we call "constant temperature." Such a condition really does not exist. There are two ways of controlling the temperature within an automatic refrigerator. One is to place a temperature controlling device within the food compartment of the refrigerator, and set it to maintain as even a temperature as possible. The other method is to place a temperature controlling device on the chilling unit, and set it to maintain as constant a temperature as possible. Both methods have their advantages and disadvantages. In the first case, where an attempt is made to maintain a constant food compartment temperature, the chilling unit temperature will vary in accordance with the load, becoming colder in warm weather than in cold. From this it will be seen that the chilling unit will defrost without warning, if the room temperature in which the refrigerator is placed, decreases to about fifty degrees; but the food compartment temperature will remain constant. If the owner is not aware of this fact, the conclusion that the refrigerator is not functioning properly, is immediately reached, and request for service is made.

In the second case, where the temperature controlling device is placed on the chilling unit, the freezing speed is always constant, regardless of reasonable room temperature variations. This is because of the fact that the chilling unit is always held at nearly a constant temperature. Food compartment temperature will then, of course, vary with the room temperature, being colder when the room is cold, and warmer when the room is warm. Experience has shown that the food compartment temperature will change about one degree for each three degrees variation of room temperature. This change will occur however, about three or four hours after the room temperature has changed. This time lag is due to the excellent insulation now used in modern refrigerators. The temperature within a refrigerator of the latter type, will drop below the freezing point if the refrigerator is in a room temperature below fifty degrees, for a period in excess of three or four hours. From the above it will be seen why all automatic refrigerator manufacturers prefer to place refrigerators in a kitchen or breakfast nook, where the room temperature variations are not extreme. Besides being more convenient to use, a refrigerator so placed, will give more satisfactory operation.

At least ninety percent of all automatic refrigerators now on the American market, have their temperature control from the chilling unit, and therefore, consequently have a variable food compartment temperature. They are designed to maintain a food compartment temperature between forty and fifty degrees, in room temperatures between approximately sixty to ninety degrees. From this it will be seen that if a salesman, either through ignorance, or zeal to consummate a sale, promises a constant temperature, he is committing his service department to something which it is impossible to accomplish. It will also be seen that it is not wise to furnish the customer with a thermometer and allow him to worry about temperature. A service man upon investigating a temperature complaint, should first determine the location of the thermostat bulb. If the bulb is in the food compartment, the thermostat should be so adjusted as to keep the food compartment temperature at forty degrees, irrespective of whether or not there is any frost on the chilling unit. If the bulb is on the chilling unit, the temperature of the chilling unit should be eighteen degrees, irrespective of whether the food compartment temperature is below thirty two or above fifty.

—H. W. Leighton, Annual Convention, Pacific Coast Gas Assn., Sept. 1930

Pipe Lines Cause New Economic Problems

(*Continued from page 41*)

be well for railroad executives to study this possibility. They may by study find that they can enter into pipe-line transportation business just as they are finding it advantageous to enter into the bus, truck, and often airplane transportation activities. Such a combination would be progressive and constructive in influence, not merely restrictive as are some of the other proposals that appear to emanate from short-sighted railroad men.

But whatever the railroad men may do, the gas-company executives must study and solve their part of this problem promptly.

Measuring the Temperature of Flames

THE temperature of solids may be estimated by the eye or accurately measured by means of a mometer, thermocouple, or optical pyrometer. Flames, particularly non-luminous flames, present a more difficult problem. A flame may be hot enough to melt platinum and yet look fairly cool to the eye, conversely, there are certain luminous cool flames which will not burn the hand. This is because the radiation from flames does not follow the laws which apply to solids; for example, much of the radiation from the ordinary Bunsen type of flame is in the invisible infra-red region of the spectrum.

In a method for measuring flame temperature being employed at the Pittsburgh Experiment Station of the United States Bureau of Mines, Department of Commerce, the flame is colored yellow with sodium vapor and the intensity of this light compared in a spectroscope with the light from a heated solid at known temperature. The work is being carried out as one phase of a study of the physics and chemistry of gaseous combustion and explosion. Values have been obtained for stationary flames of different mixtures of air with methane, ethane, propane, butane, iso-butane, ethylene, propylene, and butylene. Maximum flame temperatures vary from 1880° C. for methane to 1975° C. for ethylene. The mixture of gas and air which gives maximum temperature does not correspond to that which gives maximum flame speed except for methane and Pittsburgh natural gas. For all other hydrocarbons tested, the mixtures which produced the highest flame temperature contain less combustible gas than those which give the highest speed of flame. The percentage of combustible gas in air which gives maximum flame temperature is slightly on the rich side of that required for exact combustion to carbon dioxide and water. Maximum calculated temperatures are 40° to 70° C. higher for the saturated hydrocarbons and about 100° C. higher for the unsaturated hydrocarbons than the experimental values. Radiation losses account for the lower measured temperatures

A Winner

CUSTOMERS of the Consolidated Gas Company of New York and affiliated gas companies took part in an essay contest recently, on the subject, "What Phase of Gas Service Makes the Most Important Contribution to the Comfort and Convenience of the Modern Home?"

First prize of $25.00 was won by Miss Annabelle Mosher, of 191 Waverly Place, for her essay on house heating with gas. An essay on gas refrigeration was awarded second prize of $15.00, and two essays on automatic cooking and one on water heating were each given $5.00 prizes.

The prize winning essay follows:

"Great selective ability is required in choosing the outstanding good rendered to humanity by the Automatic Gas Service, yet without long hesitation I cast my vote for the house heating feature of your service.

"I live in the old Chelsea district of the city where Dutch mansions have been converted from heatless vacuums to liveable quarters by the installation of gas heating appliances. Without marring the sturdy beauty of these old homes, modern convenience and gracious warmth have made the houses twice as charming to their residents.

"New Yorkers, in a pinch, can eat their meals out, they could still resign themselves to the daily visits of the ice-man if it were necessary, but to endure the grim blasts of a Manhattan winter without an adequate heating system, would be woe to contemplate. A cozy, glowing fire in the bedroom makes getting up and getting started for the day a less exasperating affair. Midnight chats around a trusty fireplace, where conversation never languishes and neither does the supply of logs, makes and keeps friends, and envious callers. To my mind, the necessities are always to be rated above the luxuries, and that is why gracious living is always synonymous with a gas heated home."

Some of the contributions were in verse, and several were illustrated with semi-humorous thumb nail sketches by the authors.

The only announcement of the contest was made in the October issue of the Greater Service News, the company's publication that is mailed with gas bills.

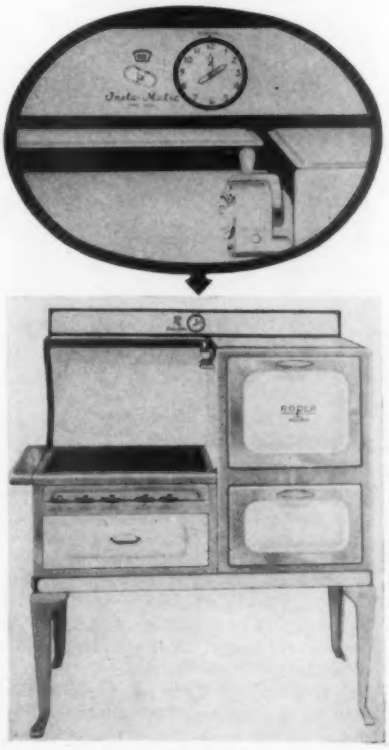
Interesting Facts About the Coke Industry

The Coke and Gas Industries in 1929 (Census data):		
Number of establishments	859	
Wage earners, not including salaried employees	63,738	
Wages paid	$ 94,000,000	
Cost of purchased fuel, electricity, and materials	472,000,000	
Total value of products	928,000,000	
Value Added by Manufacturer	456,000,000	
Coke production in 1930:		
By-product ovens	45,500,000	short tons
Beehive ovens	2,750,000	short tons
Total	48,250,000	short tons
Percentage from by-product ovens	94	per cent
By-products produced in 1930:		
Gas, total	720	billion cubic feet
Light oil, crude	170	million gallons
Tar	580	million gallons
Ammonia, total calculated as sulphate	725,000	tons

EQUIPMENT NEWS

New Roper Automatic Gas Range

Geo. D. Roper Corporation, Rockford, Ill., announce the new Roper Insta-Matic time and temperature controller gas range. The control feature is a clock device as shown in illustration. There is only one pilot light located in the cooking top. An iron pipe is firmly affixed to the back of the range, connecting the inlet pipe from the city gas supply and the clock control.



Roper Insta-Matic time and temperature controller gas range

It is claimed that an outstanding feature of this new range is that it is absolutely safe. If a top burner or oven burner flame is extinguished accidentally, the Insta-Flame re-ignites that burner instantly. If the Insta-Flame Pilot goes out, a perfected thermostatic safety valve shuts off all gas entering the manifold. This arrangement eliminates all danger of gas escaping from any burner or the pilot.

Another feature is that if the oven only is to be used, by adjusting the time and temperature control, the oven burner ignites automatically and is ready for use.

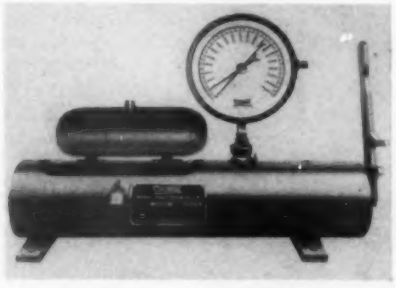
The time control device has been designed to become an integral part of the range. The only visible evidence of time control on the range is the dial of the time clock which neatly fits into, with hands protruding through, the back rail for handy operation. Beside it is located the "on" and "off" switch.

Full details regarding these new features will be mailed on request.

Portable Machine For Testing Welds

Oxweld Acetylene Company, 30 East 42nd Street, New York, announces The Oxweld Portable Tensile Testing Machine, designed to facilitate the testing of welds in the field or shop.

This machine weighs 165 lb. and measures 28 in. in overall length and 6¾ in. in maximum diameter. It is a self-contained, totally enclosed unit. When closed for shipment, there are no projections and



Oxweld Portable Tensile Testing Machine

the machine presents a comparatively smooth cylindrical surface. The accompanying illustration shows how the machine appears when open and ready for making tensile tests.

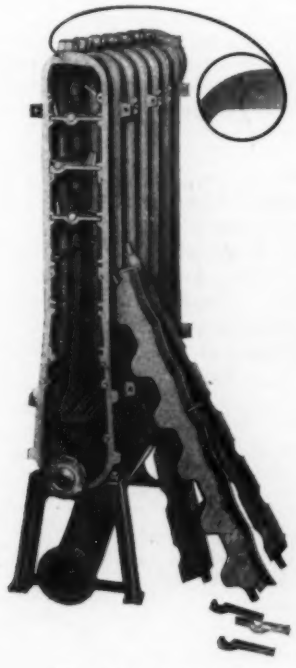
The machine consists of a tubular compression member with a set of grips in the head and a hydraulic cylinder block in its base. The cylinder block contains a communicating pump and cylinder directly machined into a single block, and the cylinder pressure operates a piston carrying a second set of grips.

The specimen to be tested is placed between the jaws, which have spring grips. The release valve is closed and the pump handle, applied at the end of the cylinder is moved back and forth. A set of conical blocks has also been constructed to fit into the machine head in place of the grips so that the standard ½ in. diameter round specimens may be tested if desired. The load is measured directly in pounds per square inch by a suitable, calibrated pressure gauge actuated by the pressure in the cylinder. The gauge is one of the essential parts of the apparatus. When a test is finished, the pressure may be releasd by a valve and the piston may be returned to its original position by using the pump handle as a lever.

This machine makes it possible to secure a tensile test result immediately after welds are made It also facilitates making periodic check tests of the operators and in many cases provides a ready means for testing sections cut at random by the inspector from completed work.

Fox Furnace Company Announce New Gas Furnace

The Fox Furnace Company, Elyria, Ohio, recently announced their new heating, ventilating and humidifying gas furnace known as the Gas Automatic. The Heating Unit is built of heavy cast iron,



The Gas Automatic

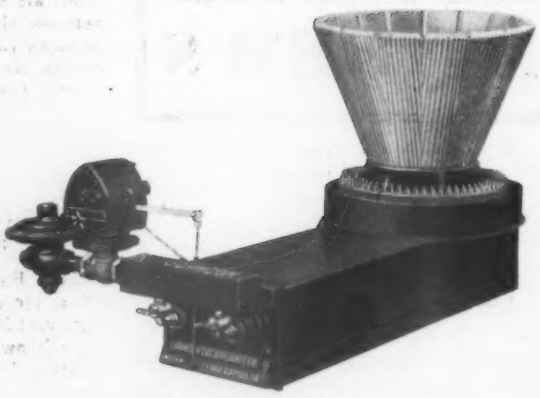
each unit consisting of two sections, and is so constructed as to give free and unobstructed flow of air. Six baffles horizontally placed above burner, insure that the products of combustion are completely utilized before entering the flue. The Gas Automatic Heating System is made entirely automatic in operation through the use of room thermostats which open and close the gas valves.

The Gas Automatic can be equipped with air filters in the return air duct which remove from the circulating air all dust or dirt. In addition, the furnace can be equipped with a blower, automatically operated which assures positive circulation of warm air while the heating unit is under fire. In warm weather this blower can be used to circulate cool air throughout the house.

New Johnson Conversion Burner

The Johnson Gas Appliance Co., Cedar Rapids, Ia., announces the new Johnson

Conversion Burner for hot air furnaces and hot water and steam boilers. They state that they have incorporated in this burner the patented Johnson Direct Jet Gas Orifice Adjustments and large range, positive air adjustments. This double control results in a perfect mixture which assures minimum gas consumption and higher flame temperature. Further increase in the efficiency of the machine was attained by producing a new type of heat-radiating baffle. Burner noises have been practically eliminated. The Burner is completely automatic, operating by thermostatic control. A positive and simple safety pilot light automatically shuts off the gas supply, should it be found that for any reason the gas supply should be cut off.

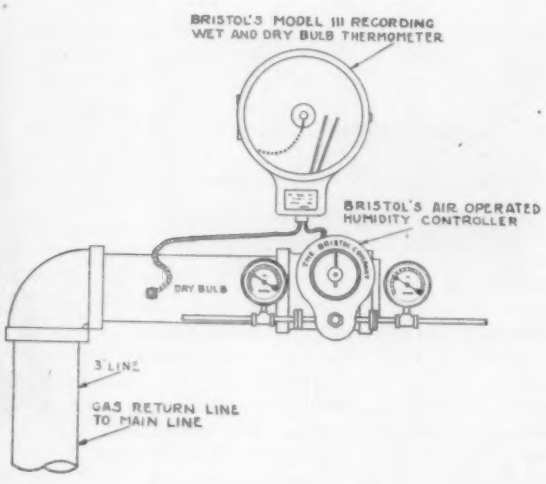


Johnson Conversion Burner

Descriptive folder will be sent on request.

Bristol's Air Operated Humidity Recording and Control Equipment for Automatically Controlling Humidity in Saturating Natural Gas With Steam

The Bristol Company, Waterbury, Connecticut, has developed a control system for automatically controlling gas humidity where steam is used to saturate natural gas before it enters the city distribution system.



The control system consists of a wet bulb thermometer control instrument with bulb in the gas line, a diaphragm motor valve in the steam line furnishing steam for saturation, and a wet and dry bulb recording the thermometer for recording the humidity of the saturated gas.

Under operation, the controller automatically maintains 100 per cent gas saturation for all rates of gas flow.

Westinghouse FlexArc Pipe Line Special

A new 600-ampere FlexArc, single-operator, engine-driven welder for pipe line welding was recently placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The demand for higher speed in welding gas and oil pipe joints in the field has led to the development of this special welder for use with high speed, high current, large size, coated electrodes using high voltage arcs. While the machine is designed primarily for use with such electrodes, the application of the FlexArc principle permits equally good operating characteristics and arc stability on the low current ranges with small electrodes. The machine is particularly adapted to rough and severe field service where sustained loads and high currents are required over long periods.

This new welding unit provides welding currents up to 750 amperes for every job encountered by the pipe line welding operators. The welding generator is the variable voltage, constant current type operating at 1450 rpm. The new Westinghouse Flexactor is incorporated in the welding circuit, thus eliminating current surges at the time of striking the arc and while welding.

The driving power consists of a six cylinder gasoline engine with an S.A.E. rating of 51.2 and 83 brake horsepower at 1450 rpm. This horsepower rating has been selected by the manufacturer to provide sustained power and long life. The welding unit is equipped with a 25 gallon gas tank, Pierce governor, Eisemann magneto, large air cleaner, oil filter and protective radiator guard.

New Insulated Junior Restaurant Range Being Introduced

The Standard Gas Equipment Corp., 18 East 41st St., New York City, are now introducing a new line of Junior Restaurant Ranges. These fill the needs of small restaurants, tea-rooms, clubs, churches, lunch-wagons, etc., where regular heavy duty equipment is not required, yet where large domestic ranges are inadequate.

Design features include ovens thickly insulated with felted rock wool. An automatic oven heat control is provided as optional equipment. These Junior

Junior Restaurant Range

Restaurant Ranges come in four sizes, a six-burner range, four-burner range, with combination, cake griddle, broiler and toaster, a ten-burner range and an eight-burner range, with griddle, broiler and toaster.

The removable star burners are lighted by automatic top burner lighters. Griddles are of the raised edge type, pitched slightly to rear so that any surplus of grease drains back into the drip pan. The broiler grid may be adjusted to several heights.

The finish is black baked Japan with the exception of doors, which are of blued steel. Fittings are nickel plated. Other features include all flush construction doors with concealed hinges, and concealed manifold. Secret flues are at the back.

Catalog describing these ranges will be mailed upon request.

Galveston Gas Plant

Preliminary plans are being studied by the city council of Galveston, Texas, for a municipally-owned gas and electric plant. Mayor Jack Pearce brought the matter before the council at a recent meeting, with the suggestion that experts make a survey of the city and secure full data to determine if it would not be cheaper for the city to own its own plant rather than buy from private concerns.

NEWS OF THE GAS INDUSTRY

New Gas Mains at Breckenridge

Improvements will be started at once in Breckenridge, Texas, by the Texas-Louisiana Power Company, according to C. G. King, district manager for the company, who has announced that between fifty and sixty men will be put to work at once laying approximately 4,000 feet of eight-inch gas mains. Several thousand dollars will be spent in this work. The new mains will tap a new natural gas source, and in addition to serving Breckenridge will give the company three large lines with which to furnish patrons of adjacent communities.

Natural Gas Market Assured

The Five Square Oil Company and the Standard Oil Company of Colorado are to drill many wells within seven miles of Loveland, Colorado where they already have oil and gas and the Colorado & Wyoming Gas Company, a subsidiary of the Public Service Company of Colorado have informed the oil concerns that it will purchase all the natural gas offered. The C & W is that branch of the Public Service Company of Colorado now serving cities between Denver and Cheyenne with natural gas, including Cheyenne.

To Lay 6-Inch Gas Line

Laying of a six-inch natural gas line from its No. 1 Comstock well in the Agua Dulce field in western Nueces County to the refinery at Corpus Christi, has been started by the Houston Oil Company, Houston Texas. The well is located approximately a mile from the old Agua Dulce field and is estimated to have a production of 40,000,000 cubic feet of wet gas per day.

Seek Authority to Transfer Franchises

The Brockport, N. Y., Gas Light Company has applied for authority to transfer its franchises, works and system to the New York State Electric and Gas Corporation.

The company furnishes gas for light, heat and power in the village of Brockport, the town of Ogden and the village of Spencerport in Monroe county.

It is contended in the company's petition that the operations of the company are in territory adjacent to that served by the New York State Electric and Gas Corporation, and its property is geographically capable of being operated in conjunction with the system of the latter company as one unit supervised by a central coordinated operating staff and that the consolidation of the companies will bring about more efficient service and extensions.

United Gas To Lay 425-Miles Pipe Line

Contracts have been awarded to the United Pipe Line Company, a subsidiary of the United Gas System, for the construction of approximately 425 miles of natural gas pipe lines to serve the communities in Southwest Louisiana. Work is to be started immediately and will be completed by March 1, according to the announcement.

The main feeder line will start at a point near Kirbyville, Texas and will extend for a distance of 158 miles to Franklin, La. This line will serve DeQuincy, Crowley, Welch, Jennings, Broussard, Youngsville, St. Martinsville, New Iberia, Jeanerette and Franklin. It will be made up of 46 miles of 14-inch mains; 16 miles of 12-inch mains, 53 miles of 10-inch, 30 miles of 8-inch and 13 miles of 6-inch.

From the main line, six lateral lines will be extended which will serve 40 communities. These lateral lines will total approximately 265 miles, and will be known as the DeRidder line, serving Merryville and De Riddler; the Vinton line serving Lake Charles, Sulphur, Westlake, Vinton, Edgerly and Lockport; the Marksville line serving Kinder, Elton, Oakdale, Elizabeth, Chaneyville, Le Compte, Bune, Cottonport, Mansura, Hessemer and Marksville; the Washington line, serving Rayne, Church Point, Eunice, Opelousas and Washington; the Breaux Ridge line serving Lafayette and Breaux Ridge; and the Abbeyville line serving Milton, Erath and Abbeyville.

All surveys for the main lines have been completed and plans drawn for the river crossings. Multiple lines will be provided across the Sabine River where three 10-inch mains will be laid, and across the Calcasieu River, where three 8-inch mains will be installed.

Preparing For Natural Gas

Colorado Springs owns its own gas plant, and has arranged to substitute natural gas for artificial, the gas to be brought from Stevens county Kansas and sold wholesale to the city. To make the necessary changes and extensions it has set aside $197,000 to be spent during 1931. The city buys the gas at its own city limits.

United Gas Improvement Co. Acquires Two Pennsylvania Companies

The United Gas Improvement Company, through its subsidiary, Commonwealth Utilities Corporation, has acquired the Chester Valley Electric Company and the Kennett Gas Company, John E. Zimmermann, U. G. I. president, announced recently.

Chester Valley Electric Company supplies electric service to forty-two communities in the Chester Valley area near Philadelphia, including Downingtown and the important steel-making center of Coatesville. Kennett Gas Company supplies gas service to a population of about 5,000 in Kennett Square and four other communities.

These properties were acquired from National Public Service Corporation through exchange of the Columbus, Delaware & Marion Electric Company, a subsidiary of Commonwealth Utilities Corporation, supplying electric and interurban railway service in Marion, Ohio and vicinity, and the Mt. Gilead Water, Light, Heat and Power Company and the Morrow Public Service Company, small subsidiary companies of the Columbus and Marion company.

The acquisition of the Pennsylvania companies, Mr. Zimmerman stated, is in line with U. G. I. policy to group its holdings wherever possible, so as to unify gas and electric service.

Philadelphia Electric Company and Delaware Power and Light Company, U. G. I. subsidiaries, now operate in or adjacent to the territories served by the Chester Valley Electric Company and the Kennett Gas Company.

Allegheny Gas Sales Gain 101% In October

Sales of natural gas for the month of October by Allegheny Gas Corporation, 36 per cent of the common stock of which is owned by Appalachian Gas Corporation, amounted to 190,715,000 cubic feet, compared with 94,778,000 cubic feet during the same month last year, a gain of 95,937,000 cubic feet or over 101 per cent. This establishes a new high record of monthly gain in sales, a 70 per cent gain having been registered in the preceding month.

The large gain is attributed to general increase in industrial activity in the area served with natural gas, and the recently completed interconnection of the company's various producing fields so as to assure maximum output. Allegheny Gas Corporation controls 48,711 acres and owns or controls 168 wells with estimated gas reserves of 32,841,732,000 cubic feet.

Northern Indiana Public Service Take Over Goshen and Monticello Properties

The Northern Indiana Public Service Company recently took over the management of the Goshen and Monticello divisions of the Interstate Public Service Company. W. E. Murchie is manager of the Goshen division and E. C. Burch is manager of the Monticello division.

The Public Service Commission of Indiana authorized in September the sale of these Interstate properties to the Northern Indiana Public Service Company and the sale of their Lafayette, Crawfordsville, Lebanon and Frankfort districts to the Interstate. The actual transfer of the properties was made January 1st.

The Goshen division includes, in addition to Goshen itself, the Warsaw district of which Joseph Lessig is manager. The Monticello division has offices in Monticello, Kentland, Fowler and Monon.

Gas Company Moves Headquarters

Headquarters of the Houston Gas and Fuel Company of Houston, Texas, a distributing unit of the United Gas System, have been moved to the first, sixth and mezzanine floors of the Chamber of Commerce building of that city. Payment of bills will be handled on the first floor, the new business department and a portion of the accounting department will be located on the mezzanine, and the general offices housed on the sixth floor.

The move was necessitated through increased business of the company which demanded larger quarters, according to W. Gardner Winter, vice president and general manager.

Southern Cities Public Service to Continue Construction Work

That the 1931 schedule of construction will be followed to the letter by the Southern Cities Public Service Corporation is indicated in a letter of instruction to local managers just issued by R. C. Hoffman, vice-president and executive manager of the concern.

"We have," says Mr. Hoffman's letter, in part, "every confidence in the future of the gas industry, our operations and the section that we serve. It is the intention of the company to continue its program of construction and betterment for the year 1931 irrespective of present temporary business conditions."

Thirty-one gas companies in Georgia, North and South Carolina, Florida and Alabama, are controlled by the Southern Cities Public Service Corporation which, in the past eighteen months has spent $6,000,000 in permanent improvements.

Convention Calendar

January

16-17 Operating Division of the New England Gas Association, fifteenth annual meeting, Hotel Bond, Hartford, Conn. Paul Buchanan, Hartford, Conn., secretary-treasurer.

26-29 American Society of Heating & Ventilating Engineers, 37th annual meeting, William Penn Hotel, Pittsburgh, Pa.

February

3-5 New England Gas Association, annual convention, Hotel Statler, Boston, Mass. C. D. Williams, executive secretary, 41 Mount Vernon Street, Boston.

12-13 Fifth Mid-West Regional Gas Sales Conference, Commercial Section of American Gas Association, Sherman Hotel, Chicago, Ill. C. A. Nash, Davenport, Iowa, chairman.

March

10-12 Oklahoma Utilities Association, Oklahoma City, Okla.

12-13 Illinois Gas Association, annual convention, Springfield, Ill. George W. Schwaner, 205 Illinois Mine Workers Bldg., Springfield, Ill., secretary-treasurer.

Resume Work on Construction of Gas Line

With a restraining order issued by Judge Holmes, of the Southern United States District Court, served on Mayor M. W. McLaurin, of Laurel, Miss., work has been resumed on the construction of a natural gas line into the city by the Southern Natural Gas Company.

The order, which prevents Mayor McLaurin from interfering with the construction of the line, becomes effective immediately, and, according to W. R. Collier, vice-president of the company, mains will be laid into the city as planned.

Work was recently stopped at the city limits when the city officials refused to grant a new franchise.

File Articles of Incorporation

Articles of incorporation have been filed with the secretary of state here by the Cato Gas and Oil Corporation of this city. The corporation is formed to drill for and distribute natural gas and has an initial capital stock of 10,000 having no declared par value. The first board of directors is composed of Virgil E. Bolyard, Stephen M. Davis and Frank V. Hawkins.

Apply for Approval of Franchises

The Central Hudson Gas & Electric Corporation has applied for approval of local franchises under which it will extend its gas distribution system into Esopus and Marlboro, Ulster County, New York.

Pittsburgh Prepares Program for A. S. H. V. E.

Under the leadership of H. Lee Moore, General Chairman of the Arrangements Committee for the Pittsburgh Chapter, plans have progressed rapidly for the 37th Annual Meeting of the American Society of Heating and Ventilating Engineers to be held at the William Penn Hotel, January 26 to 29.

Eight sub-Committees are handling Program, Reception, Registration, Banquet, Entertainment, Transportation, Publicity and Finances.

The meeting will be called to order by Pres. L. A. Harding, Buffalo, at 2:00 p. m. Monday, January 26 at the William Penn Hotel, and on each day thereafter technical sessions will be held. On Wednesday all scheduled events will be transferred to the A. S. H. V. E. Research Laboratory at the U. S. Bureau of Mines Experiment Station where a technical program will be given in the morning and the afternoon will be devoted to inspection.

Natural Gas Franchise Granted

The Public Service Company of Colorado has been granted a franchise, by the city council of Brighton, Colorado, to serve that city with natural gas. The gas supply will come from its Denver-Cheyenne pipe line, the tap to be made near Broomfield, Colorado.

Appalachian Gas Corporation Has 617 Wells

Subsidiaries and affiliates of Appalachian Gas Corporation, exclusive of Memphis Natural Gas Company, owned or controlled 617 natural gas wells at the end of October, it is announced. Wells are located in the States of West Virginia, Ohio, Kentucky and Texas. The greatest number 168, is owned by Allegheny Gas Corporation, with Ohio Valley Gas Corporation second with 158 wells. Estimated gas reserves are 151,818,547,000 cubic feet, exclusive of Texas Gas Utilities Company and Memphis Natural Gas Company. The latter company secures its supply of gas under long-term purchase contract from the Louisiana fields.

Commission Gives Permission to Use Therm Rate Billing

The Public Service Commission of Indiana recently authorized Northern Indi-

ana Public Service Co., to bill gas on a therm rate basis in Hammond, East Chicago, Whiting, Michigan City and adjacent suburban communities. This authorization was the result of a petition which the company had filed with the Commission.

The therm basis of billing became effective as to all gas bills rendered in these communities on and after December 1.

Cities Service Shows Increase in Net Earnings

For the year ended November 30, 1930, net earnings of Cities Service Company showed an increase of 41 per cent over the corresponding period a year ago. Net earnings were $58,781,452. The unbroken climb in net earnings now extends over 31 consecutive 12-month periods.

The Company's net earnings for November, 1930, were $4,439,678 as compared with $4,314,815 for November 1929. Net to Stocks and Reserves for November, 1930, were $3,416,128, whereas in November 1929 they were $3,791,192. Net to Common Stock and Reserves for November, 1930 amounted to $2,802,665, and in November, 1929, this figure was $3,177,731.

Net earnings of Cities Service Company for the twelve months were 6.59 times Interest and Discount on its Debentures. Net to Stocks and Reserves amounted to $49,865,491, or 6.77 times Preferred Stock Dividends. This compares with $34,818,897, or 5.09 times for the year ended November 30, 1929. Net to Common Stock and Reserves amounted to $42,503,959 or $1.43 per share on the average number of shares outstanding, an increase of more than 51 per cent over the previous year when Net to Common Stock and Reserves amounted to $27,982,813 or $1.14 per share.

Coincident with the publication of its earnings statement, Cities Service Company announced monthly dividends of 2½ cents per share in cash and ½ of 1% in stock on the Common Stock. Regular monthly dividends of 50 cents per share on the Preferred Stock and Preference BB Stock and 5 cents per share on the Preference B Stock were announced, all payable February 2, to stockholders of record January 15.

Gets Good Gas Well

The Midwest Refining Company drilling on the Bell Rock structure in Moffat county, Colorado, uncorked a gas flow of thirty-five million cubic feet. The well is 3,040 feet deep.

Option on Franchise Granted

A two-year option on a franchise to provide gas to local residents, has been granted the Indiana Gas Utilities Corporation of Richmond, Ind.

Gas Display at Power Exposition

Heating, cooling and drying operations demonstrated the versatility and adaptability of gas fuel at the exhibit the American Gas Association sponsored at the Ninth National Exposition of Power and Mechanical Engineering, at Grand Central Palace, New York, N. Y., December 1 to 6. The following gas companies in the Metropolitan area cooperated with the association in arranging the exhibit:

A.G.A. Exhibit at the Ninth National Exposition of Power and Mechanical Engineering

Consolidated Gas Company of New York, The Brooklyn Union Gas Company, The Brooklyn Borough Gas Company and New York and Richmond Gas Company.

The gas display occupied nearly 1500 square feet of space. Decorations were modern, the dominating feature being a huge representation of a gas flame. Many of the latest types of gas appliances were on display, most of them in operation. There also was a large display of nationally-known products, which have been processed by gas.

The following gas equipment was on display:

Rotary carburizing furnace, manufactured by the American Gas Furnace Co.; The Kemp air-gas mixing machine, used in connection with the Kemp immersion system of heating low melting point metals and solutions (Manufactured by The C. M. Kemp Manufacturing Co.); The Selas Company's air-gas mixing machines in connection with internally heated soldering irons; Gas-fired boiler and boiler water feeding pump, manufactured by the Mears-Kane-Ofeldt Co.; The Ensign-Reynolds Co. gas compressor supplying gas for a group of special burners, and also for supplying gas to internally heated solution tanks: The unit heater, a self-contained gas-fired air heater, manufactured by the General Gas Light Co.; A water cooler and an optical lens chiller, manufactured by Electrolux Refrigerator Sales, Inc.; A nozzle mixing blast burner with temperature control, made by the Partlow Corp.; The Carrier Weather Maker for supplying conditioned air for space heating and industrial processes, manufactured by the Carrier Lyle Corp.

An application of large volume water heating by The Bryant Heater and Manufacturing Co. in connection with the Patterson-Kelley Co. indirectly heated hot water storage tank; Ideal boiler, manufactured by the American Gas Products Corp.; The Surface Combustion Co. gas fired forge furnace, with temperature control supplied by the Wilson-Maeulen Co., Inc.; The gas-fired boiler with boiler feed water pump, manufactured by the Eclipse Fuel Engineering Co.

The following committee of the American Gas Association were in charge:

C. W. Berghorn, American Gas Association; C. Y. McGown, Consolidated Gas Company; C. E. Muehlberg, Consolidated Gas Company; R. H. Staniford, Jr., The Brooklyn Union Gas Company; A. L. Palmer, The Brooklyn Union Gas Company; O. E. Barene, The Brooklyn Borough Gas Company, and J. A. Reynolds, New York and Richmond Gas Company.

R. M. Martin, of the Consolidated Gas Company, was in charge of the preparation of the exhibit.

Order Revision of Gas Rates

Revision downward of gas rates at Athens and Columbus, Ga., has just been ordered by the Georgia Public Service Commission.

In Athens, a service charge of $1.00 has

been established by order of the commission, with a rate of $1.50 per thousand for the first 2,000 feet; $1.30 for the next 2,000 feet, and $1.10 for all gas used over 5,000 feet. The old charge was $1.90 flat per thousand feet without service charge.

In Columbus the commission has established a service charge of $1.00, with rates as follows: first 2,000 cubic feet, $1.40; next 2,000 feet, $1.20, and all over 5,000 feet, $1.00 per thousand.

Under the new rates, those using 2,000 feet or under will have somewhat higher rates, while those using over 3,000 feet will have a material reduction.

Rutgers University Offer Home Study Course In Gas Manufacture, Distribution and Utilization

Rutgers University, New Brunswick, New Jersey, is offering a home study course in manufacture, distribution and utilization of gas. This course is endorsed by American Gas Association. It embodies the fundamental principles in the successful operation of a manufacturing gas plant. The course has been written in non-technical language, is adapted to the especial use of employees in the gas industry and is of such a nature as to require little or no knowledge of physics or chemistry.

The author of the text is Charles E. Reinicker, C. E., Assistant to Vice-President of the United Gas Improvement Company of Philadelphia, and is an engineer of recognized ability in the gas industry. He has been assisted in the preparation and arrangement of the course by E. F. Pohlman and S. J. Modzikowski, The Peoples Gas Light and Coke Company, Chicago and A. M. Boyd, Philadelphia Electric Company, Philadelphia, Pa.

The course consists of twenty-one lessons. The full course, including all material and assignments in two bound text volumes, is sent to the student at the time of his enrollment. The cost of the course is $18.00.

Approval of Franchise Sought

Archibald S. B. Little has applied for approval of franchise in Marlboro, Ulster County, New York, under which the petitioner had plans to establish a gas distribution system in the township. Mr. Little states that he is also planning the construction of a gas system in Lloyd township.

Uncork Gas Well

On December 19 the Standard Oil Company of Colorado uncorked a gas well near Berthoud, Colorado, making about three million cubic feet daily. The well was soon connected to the pipe line of the Colorado & Wyoming Company which serves cities between Denver and Cheyenne, Wyoming.

Niagara Hudson Power Announce Construction Program

Announcement of a $30,000,000 construction program for improving service facilities in New York State during 1931 was recently made by Niagara Hudson Power Corporation. This new appropriation is in addition to the $45,000,000 spent for construction during 1930.

Plan Merger of Seven Public Utility Companies in Illinois

Central Public Service Corporation plans to merge and regroup seven public utility companies in Illinois with assets exceeding $22,000,000 and serving more than forty communities, under the Rockford Gas Light and Coke Company, according to an application before the Illinois Commerce Commission. The companies involved are the Rockford Electric Company, Illinois Public Utility Company, the Emden Water, Light and Power Company, St. Joseph-Oakwood Electric Company, Rural Gas Supply Company, and the United Fuel Transportation Company. A request was also made for authority to issue $17,500,000 of first refunding mortgage bonds and 20,000 shares of no par common stock.

Recent acquisition by Central Public Service Corporation of the assets of Southern Cities Utilities Company, including assets of United Utilities Service Corporation, which were acquired by Southern Cities, was effected in return for about 135,000 shares of Central Public Service Class A stock, having a market value of over $2,000,000. Central Public Service assumed the bonds, debentures and contingent liabilities of Southern Cities, but not its prior preferred or preferred stocks. Southern Cities retained 300,000 shares of Commonwealth and Southern common stock, subject to a loan of $4,500,000 from the latter company to Southern Cities.

Southern Cities furnishes electric light and power, water, gas, ice, street railway and business service principally to communities in Virginia, South Carolina, North Carolina, West Virginia, New Jersey, Maryland and Delaware; on certain islands in the Philippines and West Indies, and to nineteen communities on the Spanish island of Mallorca.

The group of properties which were taken over has resources of more than $50,000,000 and will bring the assets of Central Public Service to well over $400,000,000. These properties will make a substantial increase in the earnings of Central Public Service Corporation.

Granted Permission to Construct Gas Plant

The New York State Electric & Gas Corporation has been granted permission to construct a gas plant in Albion, New Orleans County, a franchise for furnishing gas in the town previously granted to the Lockport Light, Heat & Power Company, having been acquired by the New York State Electric & Gas Corporation.

Gas Utility Revenues Aggregate $519,691,351 in First Ten Months

Revenues of utility concerns engaged in the distribution of manufactured and natural gas and representing nearly 90 per cent of the industry aggregated $519,691,351 during the first ten months of 1930, it was announced recently by Paul Ryan, Chief Statistician of the American Gas Association.

The manufactured gas companies reported revenues of $314,548,799 for the ten month period, representing a slight gain over the $313,416,157 reported by these same concerns for the corresponding period of 1929. The revenues of the natural gas utilities reporting for the ten month period totalled $205,142,552, a drop of 1.5 per cent from the same interval of 1929.

For the month of October, 1930, sales of the manufactured gas companies aggregated 29,358,915,000 cubic feet, a drop of 1.3 per cent from October, 1929. For the ten months ending with October however sales totalled 294,763,036,000 cubic feet, representing a small increase over 1929.

Sales of natural gas reported for October totalled 37,364,813,000 cubic feet, a decline of nearly 9 per cent from the 1929 figure. For the ten months ending with October, natural gas sales were 437,091,877,000 cubic feet, against 442,078,401,000 cubic feet during the initial ten months of 1929, a loss of only 1 per cent.

Domestic uses continued to exhibit the stability characteristic of this phase of the business, sales and revenues from domestic users aggregating about the same for the ten month period of both 1929 and 1930. Industrial sales of natural gas however declined by nearly 7 per cent, dropping from 162,906,137,000 cubic feet to 152,229,656,000 cubic feet during the first ten months of 1930.

In New England manufactured gas sales for the ten month period were up 3 per cent, despite a drop of some 8 per cent in sales of gas for industrial-commercial uses. The Middle Atlantic States, comprising New Jersey, New York and Pennsylvania, reported a gain of 2 per cent for the period, but in the East North Central States, embracing Illinois, Indiana, Michigan, Ohio and Wisconsin, manufactured gas sales were down nearly 3 per cent. The loss in this region resulted primarily from sharp curtailment in the use of gas for industrial-commercial purposes. In Illinois this phase of the business suffered a contraction of over 5 per cent for the ten month period. In Wisconsin industrial-commercial sales dropped nearly 10 per cent, while in Indiana and

GLOVER-WEST VERTICAL RETORTS

Other Glover-West Installations

Fitchburg, Mass.
Springfield, Mass.
Portland, Maine
Ottawa, Ont.
Vancouver, B. C.
Victoria, B. C.
Watertown, N. Y.
Malden, Mass.
Fargo, N. D.
Toronto, Ont.
Guelph, Ont.
Santos, S. America
Pernambuco, S. Amer.
Buenos Aires, S. Amer.
Fall River, Mass.
Faribault, Minn.
Halifax, N. S.
Belleville, Ont.
Rio de Janeiro, S. America

PAWTUCKET GAS COMPANY—PAWTUCKET, R. I. Engineers—STONE & WEBSTER ENGR. CORP.

Three Glover-West Installations at this plant - - - - the third started producing gas in August

The first installation of Glover-West Vertical Retorts at Pawtucket was made in 1913, the second in 1927, and the third in 1930. When a gas company orders three consecutive installations—that conclusively indicates complete satisfaction with the low production and maintenance costs and the flexibility in operation of the system installed. It might be added that, due to the continuous improvement in design and construction of Glover-West Retorts the third extension was made without increasing the original plant area.

West Gas Improvement Company

Builders of Coal Gas Plants

441 Lexington Avenue New York, N.Y.

PERSONALS

E. A. Clark formerly connected with the Oklahoma Natural Gas Corporation of Tulsa, Oklahoma, and Vice-President of the Charleston Group of Columbia Gas and Electric Corporation, since March 1930, has been transferred to Pittsburgh, Pennsylvania, where he will become Vice-President of the Pittsburgh Group of Columbia Gas and Electric Corporation, with offices in the Union Trust Building.

B. C. Cobb, chairman of the board of the Commonwealth & Southern Corporation, has been elected a director of the Columbia Gas & Electric Corp.

T. W. Yelle is now district commercial manager of the Wisconsin Power and Light Company at Fond du Lac, Wisconsin.

A. M. Frost, formerly general sales manager of the North American Company subsidiaries, is now associated with the general sales department of the Pacific Gas and Electric Company, San Francisco, Call.

E. M. Lindsay has been appointed General Superintendent of the Natural Gas Corporation of California, Natural Gas Corporation of Washington and Natural Gas Corporation of Oregon. Mr. Lindsay was formerly associated with the Standard Management & Operating Corporation. He will be in complete charge of the operating departments of the aforementioned companies.

J. M. Loyd, formerly traveling auditor of the Standard Management and Operating Corporation, has been appointed Auditor of the Natural Gas Corporation of California, Natural Gas Corporation of Oregon and Natural Gas Corporation of Washington.

E. E. Hardy, Industrial Gas Engineer of the Jackson, Mich., district of the Consumers Power Company, has been appointed Assistant to the District Manager.

Frank Sweeney, assistant district manager of the Wisconsin Power & Light Company, Portage Wisconsin, has been awarded The President's Medal by the National Safety Council for saving the life of a woman through the application of the prone pressure method of resuscitation.

J. W. McElderry, who was formerly manager of the Columbus Division of the Mississippi Service Company has been appointed assistant to E. J. Stern, manager of the Eastern Division of the Southern Natural Gas Corporation, Birmingham, Ala., and will be in direct charge of general operations. Cities included in this division are Rome, Macon, Milledgeville, Rockmart, Cedartown, Griffin, Carrolton, Newman, Forsyth, Barnesville and Calhoun, Georgia.

R. A. Sharon, formerly assistant to the vice-president and general manager of Pacific Gas and Electric Company, San Francisco, is now associated with the department of public relations and sales.

Percy C. Drake, formerly Assistant Treasurer, has been appointed Treasurer of the Montreal Light Heat & Power Consolidated, Montreal, Canada. Mr. Drake succeeds Mr. G. Chagnon, who retired because of illness.

Beginning his career with Montreal Light Heat & Power in 1906 as a junior clerk, Mr. Drake has been employed in many positions and has accumulated a varied knowledge of company affairs.

Arthur N. Sainte-Marie has been appointed Assistant Treasurer of the Montreal Light Heat & Power Consolidated, Montreal, Canada. He was formerly publicity manager and in conjunction with his duties as Assistant Treasurer will have jurisdiction over the Public Relations Department.

E. H. Stachel, formerly sales supervisor of the Crown Point district of the Northern Indiana Public Service Company, was made sales supervisor of the Elkhart, Ind., district.

O. L. Hobson has been appointed acting sales supervisor of the Crown Point, Indiana, district of the Northern Indiana Public Service Company, succeeding E. H. Stachel, who was transferred to Elkhart, Ind.

A. C. Joy, formerly manager of the publicity departments of the Great Western and San Joaquin companies, has been appointed publicity manager for the Pacific Gas and Electric Company and will direct all advertising and publicity activities for the combined companies. J. Charles Jordan, formerly manager of the publicity department of the Pacific Gas and Electric Company, is now assistant manager of the department.

William P. Canavan has been appointed a vice-president of the Oklahome Natural Gas Corporation in executive charge of western Oklahoma properties including Oklahoma City, Guthrie, Enid, Shawnee, Ardmore, Norman and El Reno.

G. H. Cummings has been appointed Sales Research Assistant of the Public Service Company of Northern Illinois, Chicago, which is a newly created position. His work will consist in scientific research into every phase of the company's sales activities, to furnish the Sales Department with valuable information in guiding its work.

J. W. Duvall was recently appointed Superintendent of the Industrial Sales Department of the Oklahoma Natural Gas Corporation, Oklahoma City. He succeeds R. H. Ulrich of Tulsa, who has been appointed general assistant superintendent of the Southern Natural Gas Corporation with headquarters at Birmingham, Ala.

R. L. Harper was recently put in charge of the new business activities of the Union Public Service Company at Holton, Kansas. Mr. Harper was transferred from the company's property at Fort Scott. Natural gas was just recently turned into the distribution at Holton.

H. K. Porter has been appointed manager of the Ozark Distributing Company at Warrensburg, Mo., where natural gas was recently turned into the mains. Mr. Porter has been in charge of all the building of the distribution system there. He started in the gas business in Bartlesville, Oklahoma, in 1905, and since that time has worked in various positions.

Joseph F. McCleary, in recognition of faithful services rendered, was promoted to Chief of the Testing Laboratory at Front Street Station of the Consolidated Gas, Elec. Light & Power Company, Baltimore, Md., to fill the vacancy caused by the death of the late Carl C. S. Walter.

Mr. McCleary entered the employ of the Baltimore Company in 1917, as a Laboratory Assistant. He was subsequently advanced to the position of Assistant Chief.

C. Y. Fields, former new business representative at Wichita, Kansas, has been transferred to the Union Public Service Company at Smith Center, Kansas. Gas service has just been made available there and Mr. Fields is supervising the sale of services as well as appliances.

Clyde Ennis, director of advertising and publicity of the Southern Natural Gas Corporation, Birmingham, Ala., has been appointed chairman of the public relations committee of the Southern Gas Association, which is affiliated with the American Gas Association.

David H. Livingston, formerly assistant superintendent of distribution of the Fall River, Mass., Gas Works Company, resigned recently to accept a position in the gas department of the Consolidated Gas, Electric Light & Power Company of Baltimore, Md.

C. F. Kirchhaine, who for the past four years, has served as assistant treasurer of the Northern District of the Puget Sound Power & Light Company at Bellingham, Washington, has been promoted to the Central District, where he will serve in the same capacity.

McWANE PIPE figures *these* savings

ON PIPE.....

More feet per ton of sand-cast pipe. McWane Cast Iron Gas Pipe is modern from bell to spigot: modern in weights and strengths, giving you *more main* per dollar.

McWane Pipe tensile strength averages 29,000 lbs; its transverse strength 2,600 lbs. Made from close-grained gray iron; cuts and taps beautifully, is resilient . . . bends before it breaks. 16-foot lengths in sizes 4 inch and upward.

ON JOINTS.....

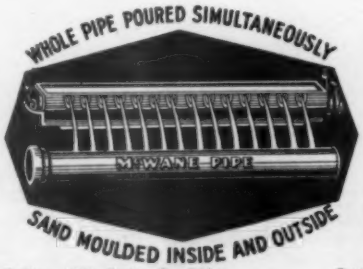
McWane Joints hold gas at low or high pressures . . . threaded, plain ends, Flexpan, or special pipe ends for high pressures; B. & S. for low. Smooth beaded spigots, smooth sturdy bells distinguish it. Strictly a quality product.

.....ON DEPRECIATION

Very small cast iron pipe reduces depreciation charge-offs. For, being cast iron, it CANNOT rust. Needs no coating or coddling. Gives you a permanent main at less cost per year than a perishable one. Same joints as larger sizes. Get new small cast iron pipe booklet just issued. Address nearest office.

McWANE CAST IRON PIPE CO.
BIRMINGHAM ALABAMA

Chicago, 208 S. La Salle St.
Philadelphia, 123 S. Broad St.
Denver, 226 Continental Oil Bldg.



Dallas, 1807 Santa Fe Bldg.
San Francisco, 111 Sutter St.
Los Angeles, 417 S. Hill St.

PACIFIC STATES CAST IRON PIPE CO.
PROVO, UTAH

Portland Ore. 611 Spalding Bldg.
Salt Lake City, 149 W. 2nd South St.

Obituary

J. FRANK STACEY

J. Frank Stacey died suddenly of pneumonia in Cincinnati, Ohio, on January 6, 1931, at the age of 77. Mr. Stacey was engaged in the gas industry all his life. For many years he was vice president and general manager of the Nashville Gas Company and later was president of Stacey Manufacturing Company of Cincinnati, Ohio, which his father, George Stacey, established in 1850. In the early part of 1930 he became associated with his brothers, A. J. Stacey and J. E. Stacey in the management of Stacey Bros. Gas Construction Company.

PATRICK GOODMAN

Patrick Goodman, President of The Safety Gas Main Stopper Company, Brooklyn, N. Y., died at his home after a brief illness, Monday, January 6, 1931.

Born in Ireland, 71 years ago, he came to this country at an early age. For many years he was foreman in the distribution department of the Standard Gas Light Company of New York. In 1897 he organized the Safety Gas Main Stopper Company. The Goodman Gas Main Stopper is known in every part of the world where gas is used.

Mr. Goodman was a member of the American Gas Association, and was also active in many charitable organizations.

CLAUDE M. DIBBLE

Claude M. Dibble, Vice President in Charge of Production of Moore Brothers Company, died on December 13 after a very brief illness.

Born in 1889 in New Haven, Conn., Mr. Dibble attended Yale University and was graduated with a degree in Electrical Engineering from the Sheffield Scientific School at Yale in 1910.

In 1923 Mr. Dibble became associated with Moore Brothers Company, Joliet, Ill., as Superintendent. His work with this Company in connection with the production of gas ranges has made him a widely-known figure throughout the gas appliance industry. In February of last year he became Vice President of the Company in charge of production.

JOHN T. WILKIN

Mr. John T. Wilkin, age 67, president of the Connersville Blower Company, died at his home in Connersville, Indiana, on Saturday, December 27. Mr. Wilkin's death was due to paralysis of the heart with which he had been suffering for the past few weeks.

He was born July 29, 1863, at Danville, Indiana. He received his early education in the Danville and Plainfield schools and was graduated from the Rose Polytechnic Institute at Terre Haute in 1886, coming to Connersville the same year, where he was employed as a draftsman by the P. H. & F. M. Roots company.

A few years later Mr. Wilkins was instrumental in organizing the Connersville Blower Company, being associated with the late R. T. Huston, J. E. Huston, John B. McFarlan, Sr., and Michael Ganley. He was first chief engineer of the Blower Company, later vice president and upon the death of the late E. W. Ansted, became president, which position he occupied for more than ten years.

During his career with the Blower Company he was credited with a number of important inventions and perfections relating to his business and just recently completed a new gearing arrangement which is considered one of his most important inventions.

As a recognition of his genius Mr. Wilkin was honored some time ago by the American Society of Mechanical Engineers of which he was an active member by being appointed as a member of the Publication committee of that organization.

Mr. Wilkin was also a member of the Franklin Institute, an organization which awards medals each year for contributions to the world of science such as inventions, etc., and was also the holder of several awards.

TRADE NEWS

United Engineers & Constructors, Inc.—Activities

Contract has been awarded by Alexandria Gas Company, Alexandria, Va., to furnish, deliver and install 35,000 feet of 3″ welded steel main for distribution system in Alexandria, Va.

Contract has been awarded by Central Indiana Gas Company, Muncie, Ind., to furnish, deliver and install approximately 36,90° feet of 3″ welded steel main between Salem, Ind., and Farmland, Ind., also contract to furnish, deliver and install approximately 47,520 feet of 10″ welded steel main between Anderson and Franklin, Indiana, 31,680 feet of 8″ welded steel main between Frankton and Elwood, Indiana, and 31,680 feet of 6″ welded steel main between Frankton and Alexandria, Indiana, and to furnish, deliver and install approximately 853 feet of 3″ welded steel main and 13,840 feet of 2″ welded steel main in the town of Frankton, Ind., 5080 feet of 3″ welded steel main and 12,440 feet of 2″ welded steel main in the town of Farmland, Ind., and 5660 feet of 3″ welded steel main and 6560 feet of 2″ welded steel main in the town of Parker, Indiana.

Contract has been awarded by the Washington, D. C., Gas Light Company, to furnish deliver and install 2900 feet of 12″ welded steel main from West Station to Service Building, Washington, D. C., at 29th and M Streets.

Contract has been awarded by the Philadelphia Electric Company, Philadelphia to furnish, deliver and install at West Conshohocken, Penna., one (1) 10,000,000 cu. ft., tank type holder, together with foundations, gas connections and auxiliary equipment, also contract to furnish, deliver and install at Chester, Penna., one (1) electric driven compressor unit, having a capacity of 340,000 cu. ft. per hour at 100 lb. pressure, together with foundations, gas connections, switching equipment and additions to building, and to furnish, deliver and install at Chester, Penna., a system of belt conveyors to receive coke from the main trolley and discharge to the existing screening plant.

Contract has been awarded by the Tampa, (Florida) Gas Company, to furnish, deliver and install, at Tampa, Florida, one (1) 30′0″ diameter by 16′9″ high, U. G. I. Circular steel purifier box, with necessary fittings and gas manifold, the new box to be located in line with the present boxes Nos. 1 and 2.

Contract has been awarded by Philadelphia Electric Company, Philadelphia, Pa., to furnish, deliver and install at Chester, Penna., one (1) 9′0″ I. D. U. G. I. Mechanical Generator Carburetted Water Gas Set, with automatic control machine and waste heat boiler, together with the necessary operating floor and accessories, the set being designed for reforming of refinery oil gas.

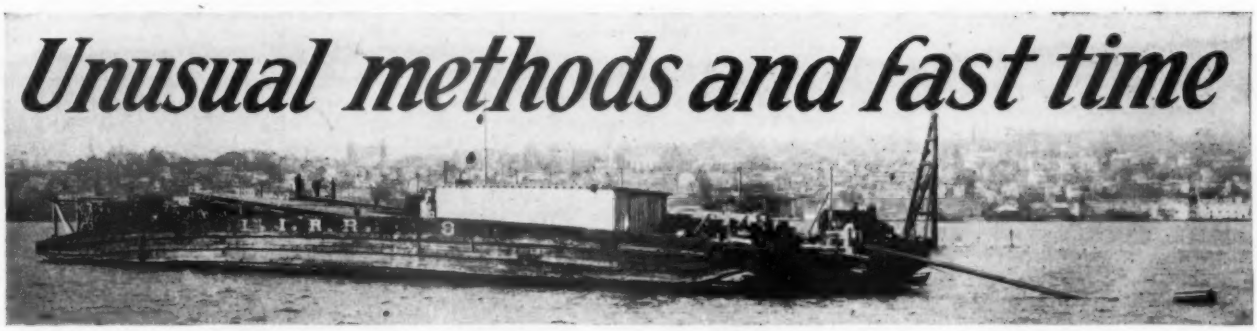
This installation will provide the fourth U. G. I. Mechanical Generator Set in this plant. The original installation of two Mechanical Generator sets was made for reforming of refinery gas. The new set will give the plant an installed daily capacity of over 22,000,000 cu. ft. of 530 B.t.u. gas.

New Catalog on Brown Tachometers

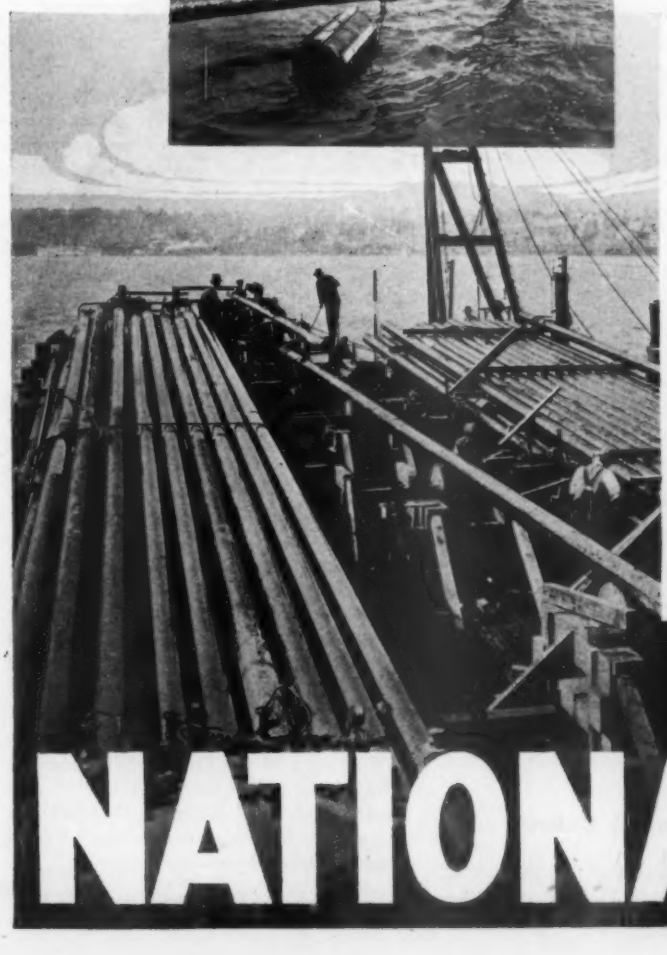
The Brown Instrument Company has just received from the printers, its new

(*Trade News Continued on page 88*)

Unusual methods and fast time



feature laying of high pressure Gas Line across Hudson River



INTERESTING and unusual construction methods were used in laying this high pressure gas line across the Hudson River between Beacon and Newburgh, New York, for the Central Hudson Gas & Electric Corporation.

The 8-inch extra strong pipe in 40-foot lengths was butt-welded together and handled in 80-foot units. The type of joint used for the line was specially designed and developed by T. A. Corby, Central Hudson Gas & Electric Corporation, and patent applied for. It consists of a butt-weld joint reinforced by a short sleeve of 9-inch standard pipe fitted over the joint and welded to the pipe at both ends. Each sleeve was tapped with a $\frac{1}{8}$-inch hole through which compressed nitrogen was admitted to the $\frac{5}{32}$-inch space between the pipe and sleeve at 350 lbs. pressure per square inch, as a test on each joint. This test was in addition to the regular test on the whole line.

Pontoons were used at 40 foot spacings to lessen strain on the pipe as it was lowered into the water. All pipe was given one coat of primer solution and one of enamel.

Despite storms, tides, rough water and heavy river traffic—6,520 feet of NATIONAL Pipe were laid in eleven days and seven hours! Another difficult river crossing added to the long list of conquests that have made NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

Brown Tachometers

(*Continued from page 86*)

catalogue No. 46 on Brown Electric Tachometers.

The catalogue contains 16 pages with illustrations. The descriptive matter covers Brown Indicating and Recording Tachometers in various models, together with the electric generators used in operating same.

There are also illustrations and data covering standard applications of this equipment.

Catalogue will be sent on request.

Recent Contracts Received by Semet-Solvay Engineering Corporation

Among recent contracts received by Semet-Solvay Engineering Corporation, of New York, for plant equipment, are the following:

Welded steel pipe and fittings of toncan metal, armco and similar alloys are being demanded. A quantity of pipe and fittings made of toncan have recently been completed for the Solvay Process Company, of Syracuse, N. Y. The pipe runs in size from 8″ to 24″ with special fittings. Welding was done with toncan welding rods.

A Semet-Solvay 30″ three-way backrun valve has been furnished for gas service in Baltimore.

R. H. Baker Company, Cambridge, Mass., have placed orders for a quantity of welded steel pipe and fittings. Pipe runs in sizes from 30″ to 36″.

William A Pope and Co., of Chicago, have ordered a quantity of 72″ welded steel pipe for the State Line Station of the Chicago District Electric Generating Company. This pipe is made from 3/16″ steel and shop tested to withstand 25 pounds air pressure. Flanges of forged steel are welded on. The pipe is to be used in the recirculating system.

The St. Charles Gas Company, St. Charles, Missouri, have ordered a quantity of purifier trays. These trays are of new and exclusive design, containing no metal in assembly. Selected lumber is used and the sections are held together with wooden dowels. There is nothing in the tray that can be affected by the sulphur in the gas entering the purifier.

The Springfield Gas Light Co., Springfield Mass., has ordered a three-way backrun valve for water gas machine operation. It is 24″ in size and equipped for hydraulic operation.

Kings County Lighting Company, Brooklyn, N. Y., is installing a quantity of 24″ and 30″ welded steel piping for the handling of foul gas. Cast steel Van Stone flanges are specified.

Citizens Gas Fuel Co., of Adrian, Mich., has ordered a two-pass napthalene scrubber, with necessary pumping and oil storage capacity. The scrubber is built to handle up to 600,000 cu. ft. of gas in 24 hours.

A quantity of welded steel piping is being installed in the steam system of the Eastman Kodak Company, Rochester, N. Y. Piping ranges in diameters from 10″ to 36″.

Shipment was recently completed of welded steel oval pipe for the Lumsden and Van Stone Company, South Boston, Mass. The pipe was equipped with cast steel flanges and tested to 50 pounds working pressure.

The Pittsfield, Mass., Coal Gas Company has ordered an installation of equipment for handling coal and coke for water gas manufacture.

When completed, this new equipment will supply the water gas generators with either coal or coke, or a mixture of both in any desired proportion and in any quantity. All fuel will be screened before delivery to the conveyor and provision made for transporting the screenings over narrow gauge rails to the boilers. As the fuel comes from the bins to the conveyor belt, the coal will be deposited first, thereby cushioning the rubber belt against the abrasiveness of

Oval welded pipe made by Semet Solvay Engineering Corp.

the coke. The operation of the conveyor is synchronized with the control of the Semet-Solvay generator fuel charging machine. The system will serve two water gas machines.

Contract has been awarded by the National Tube Company, of this city, for a Semet-Solvay light oil recovery unit. This equipment will recover light oil from the wash oil used in scrubbing coke oven gas.

The equipment includes a stripping still, heat exchanger, fractionating column, condensor, pre-heater and other operating and control equipment. The unit will be ready for operation early in 1931.

The New York and Richmond Gas Company has contracted for the rebuilding of water gas equipment. An 11′ water gas machine is to be equipped for backrun operation, with a three-way backrun valve and necessary piping. Other changes and additions which are being made to the system are carburetor air piping and air mixing, aspirator for downdraft purge, new blower connections and an installation that will permit the use of exhaust steam.

Flow Control Bulletin

The Foxboro Company has recently issued Bulletin No. 170 on Automatic Flow Controllers. This 40-page bulletin covers the complete field of flow control. It also includes Ratio Flow Control, Liquid Level Control and Flow Control under high pressures. Copies may be secured by writing to the Foxboro Co., at 38 Neponset Avenue, Foxboro, Mass.

Larmour Adams Joins Pittsburgh Equitable Meter

Announcement has just been made that "Mike" Adams, one of the best known gas meter men in the country, has joined the Pittsburgh Equitable Meter Company.

After graduating from the University of Virginia, "Mike" became associated with the Metric Meter Works of Erie, Pa. During the following twenty-four years of his career with the Metric Meter Works, he rose from an obscure blue print boy to the commanding position of major executive of the Erie Works.

He will be located at the main office of the Pittsburgh Equitable Meter Company at Pittsburgh, Pa.

Cleveland Heater Issue Attractive Sales Manual

The Cleveland Heater Company, Cleveland, Ohio, are now offering their new Deluxe Sales Helper, giving salesmen selling points and selling arguments for automatic hot water service, which will help to effectively forestall any objections that would normally be raised, develop the argument for automatic hot water service in a logical way and will give the salesman some definite ideas for presenting Rival Automatic Water Heaters.

The manual is a pictured sales story, the illustrations in color having been made by a prominent artist. The text was prompted by men who have for years successfully sold automatic water heaters. It is sufficiently large so that two can read it at the same time. The principle involved in the preparation of this book is that the sense of sight is by far the fastest to receive and register images in the mind. The eye is four times as fast as any of our other senses, and therefore, forms the basis for practical sales representation. Also the eye portrays to the mind a clearer and better understanding than the spoken word.

The price of the Deluxe Sales Helper, which is bound in limp blue leather embossed with gold lettering, is $2.00. It can also be had in an easel shaped Visual binder for $5.00.

(*Trade News Continued on page 90*)

PARTLOW UNIVERSAL CONTACTORS

For indicating temperatures—controlling flow of gas, oil and steam when used with motor-operated or solenoid valves—controlling electric heating elements—or starting and stopping motors, etc.

It embodies the three-wire thermostat control principle; using our standard mercury actuated flexible element.

The element is installed in the oven, furnace or other apparatus of which it is required to control the temperature. As the temperature in the oven or other apparatus rises to the pre-determined degree, a contact is made which stops the flow of heating medium to the apparatus, and as the temperature falls below this set degree, another contact is made which starts the flow of heating medium to the apparatus again. This automatic opening and closing of electrically operated valves, relays and solenoids, decreases or increases the supply of heating medium; thus resulting in holding an accurate and even temperature.

Send for descriptive folder

THE PARTLOW CORPORATION
New Hartford, N. Y.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

New Combustion Engineering General Condensed Catalog

The Combustion Engineering Corporation, 200 Madison Avenue, New York, have recently issued a new and revised edition of their General Condensed catalog GC-6.

This sixteen-page catalog illustrates and briefly describes the fuel burning and steam-generating equipment manufactured by Combustion Engineering Corporation, New York. A complete list of C-E products is shown on page 16.

Gas Engineering Company Taken Over By The Moody Seagraves Company

The Moody Seagraves Company of Galveston, Texas, and New York, large natural gas and oil producers, have through their subsidiary, Eastern States Gas Company, taken over the plant and business of the Gas Engineering Company of Trenton, New Jersey, established in 1902 by the late Frank D. Moses and since his death operated by Thomas Watson.

Under its new ownership the Gas Engineering Company will be under the supervision of A. C. Howard, vice president, and A. I. Phillips, vice president and general manager, of the Eastern States Gas Company.

E. N. Joseph, for twelve years in the sales and purchasing departments of the Western Gas Construction Company of Fort Wayne, Indiana, has resigned his position and will be in charge of sales for the Gas Engineering Company under its new management. Thomas Watson will remain with the same organization as a vice president.

The Gas Engineering Company is one of the oldest gas equipment manufacturing plants in the country. Further announcements of this company's plans for the future are expected to be made shortly.

Linde Expands Service Facilities

Announcement has been made that effective January 1, 1931 those units of Union Carbide and Carbon Corporation whose products are used in the main for oxy-acetylene welding and cutting are to market their product through The Linde Air Products Company. It is now possible, therefore, to secure Linde Oxygen, Union Carbide, Prest-O-Lite Dissolved Acetylene, and Oxweld, Prest-O-Weld and Purox apparatus and supplies through this one company.

This new arrangement has been made for the added convenience and economy of the users of these products. There have been no changes made in telephone numbers or addresses of the distributing stations from which these products have been secured in the past and customers can continue to place their orders at these points.

Two Orifice Prover Outfits

For the purpose of accurately proving displacement meters in place by a Company's own maintenance men instead of shipping them to the makers or to a meter shop, American Meter Company, through Metric Metal Works at Erie, Pa., has brought out simple assemblies of testing equipment known as the Pierce Critical Flow Orifice Prover, and the Metric Low-Pressure Flow Prover. The testing methods involved are based on scientific laws and can easily be learned. They are fully described on pages 121-138 of this Company's new Handbook covering all phases of Displacement Meters. Each complete outfit includes a prover nipple, a set of orifices, a thermometer, stop watch, and other requisite accessories in a handsome carrying case.

Catalog Issued On Ash Storage Tanks

Vitrified Glazed Tile Ash Storage Tanks, a product of the United Conveyor Corporation, Chicago, Ill., are described in a catalog issued by that company. Details of construction are given as well as sizes and capacities. Photographs of various installations are included.

New Bulletin Issued on Material Handling Equipment

The Robins Conveying Belt Company, 15 Park Row, New York City, recently issued Bulletin 77 illustrating and describing their conveyor and elevator belting, screening equipment and other handling units. Included also are photographs of plants whose material-handling systems were designed and constructed by Robins' engineers.

New Industrial Oven Catalog

The Gehnrich Oven Company, Inc. Long Island City, N. Y. has just issued a comprehensive catalog on their industrial ovens, which embodies a description on the approved methods of oven heat utilization and ventilation, methods of loading and conveying, with explanations of the important features of design, construction, installation and operation. The book is freely illustrated and contains many diagrammatic drawings of installations.

New Trackson Trench Roller Bulletin

The new Trackson trench roller which eliminates hand dumping and puts back all of the dirt over newly laid pipe lines is described in an attractive circular which may be obtained by writing the Trackson Co., 1319 So. First St., Milwaukee, Wis.

New Bulletin on Foundry Ovens

"Foundry Ovens" is the title of a new bulletin issued by Gehnrich Oven Company, Long Island City, N. Y. for general distribution to executives and engineers interested in foundry practice.

This bulletin discusses features of construction of various types of core baking and mold drying ovens and also ovens for aging and nomalizing castings. It presents the advances made in the design of such equipment in line with the development of modern foundry machinery.

Now Located in New Factory

The Alco Valve Company, Inc., manufacturers of automatic control valves, are now located in their new factory at 2628 Big Bend Blvd. in St. Louis. Increased capitalization, the purchase of new machinery and equipment, and an increase in personnel mark the expansion program of the company started in November.

Arthur G. McKee and Company Establish Eastern Offices

Arthur G. McKee & Co., engineers and contractors, with headquarters at Cleveland, have established an eastern office at 120 Broadway, New York City. The new office will be under the direction of Walter G. Mortland of New York. For many years Mr. Mortland has been active in the iron, steel and oil industries.

The McKee company specializes in the design and construction of iron and steel plants, petroleum refineries and general industrial construction in this country and abroad. It also makes engineering surveys and reports. The company has European headquarters office in London and is associated with the Whessoe Foundry & Engineering Co., Ltd., Darlington, England, and the Petroleum Engineering Corp., Tulsa, Okla.

Open New York Office

The United Conveyor Corporation, Chicago, Ill., recently announced the opening of their New York office at 101 Park Avenue.

This office will be directed by Mr. J. J. McNulta, who is well known through his past sales and engineering work with the Girtanner Engineering Corporation. Mr. McNulta will be in charge of the New York and New England districts

Up—up—up goes the demand for Republic Electric Weld Pipe. Gathering lines, trunk lines, construction lines,—all help swell the ever growing mileage in use credited to this most unusual pipe—more than 3000 miles placed in service.

User acceptance grows as the advantages of Republic Electric Weld Pipe become common knowledge.

Consider the weld—guaranteed 100%—stronger than the parent metal—no metal added—smooth inside and out. And the pipe—perfectly round—uniform in thickness—scale and oxide removed—and long lengths in sizes 4 to 16 inch.

Plant capacity is thirty to forty miles per day and demand is taxing present capacity. Ask for a sample for test and the reasons for the popularity of Republic Electric Weld Pipe will be apparent.

REPUBLIC

ELECTRIC WELD

MADE BY A NEW PROCESS CONTROLLED EXCLUSIVELY BY REPUBLIC STEEL CORPORATION YOUNGSTOWN, OHIO

PIPE

REPUBLIC STEEL CORPORATION

GENERAL OFFICES: YOUNGSTOWN, OHIO

Leave the Old Paint and Rust!

IMUNOL

REG. U. S. PAT. OFFICE
U. S. AND FOREIGN PATENTS
GRANTED

Covers the First and Removes the Second

A peculiar property, possessed only by IMUNOL, makes it unnecessary to scrape the old paint off the holder lifts, thus saving time, expense and the loss in service of the holder.

IMUNOL also removes existing rust, leaving a clean, smooth surface, free from corrosion.

IMUNOL gives lasting protection at little cost—We'll be glad to tell you how it is done. Write.

INERTOL COMPANY, INC.

253 BROADWAY NEW YORK CITY

Western Branch,
447 Sutter St.,
SAN FRANCISCO, CALIF.

Cleveland Gas Meters have a reputation for dependable service, the result of over thirty years' experience in manufacturing.

Our thoroughly organized and completely equipped factory assure you that the workmanship, materials, accuracy and general efficiency are unequaled.

"A" Type Meters "B" Type Meters

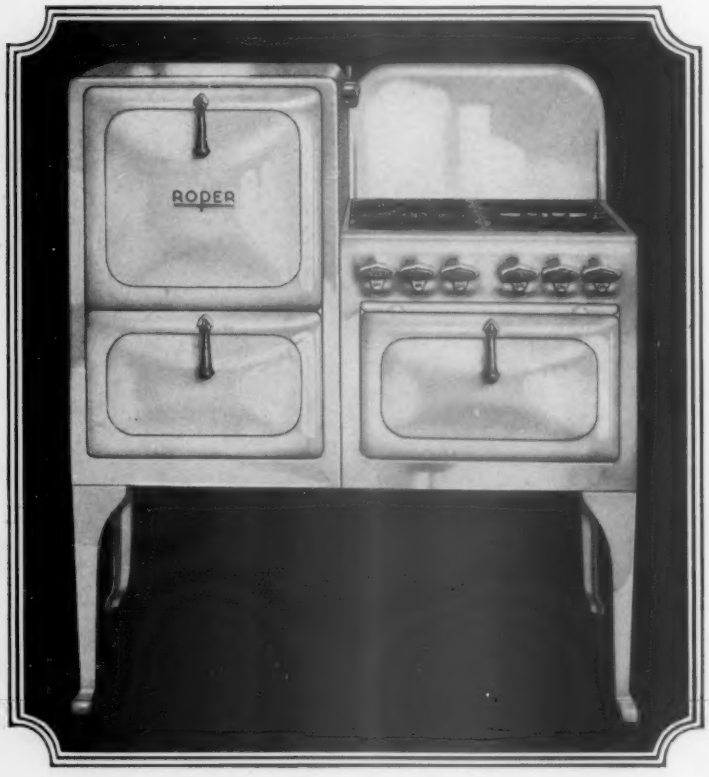
THE CLEVELAND GAS METER COMPANY

2168-2180 East 65th Street **Cleveland. Ohio**

ANNOUNCING A

NEW CREATION

BY ROPER



Obtainable With ALL These Selling Features!

1. Insta-Flame
2. Full-size Cooking Top
3. 14" High Oven
4. Cast-iron Construction
5. Rounded corners
6. Completely concealed manifold, shutters, piping, base band, nuts and bolts.
7. Correct height legs—less height over all—yet with cooking top and oven at scientifically determined convenient position
8. Ultra-Modern Design
9. Complete Oven Control
10. Insulated Oven
11. Ventilated Oven
12. Super Broiler Pan
13. Bakelite Handles
14. Porcelain Enamel Oven Linings
15. Lifetime Cooking Chart
16. Roomy Utility Drawer

. . . A Variety of Optional Finishes to Please the Most Exacting Housewife.

All Bisque

Pastel Jade Green and Bisque Poudre Blue and White—All White—Gray and White—Black and White.

A COMPLETE NEW LINE OF *COMPACT* GAS RANGES

Designed, styled, and constructed to meet the demand of the most discriminating consumer — the new Roper 2901 Series establishes a new, high standard of gas range perfection.

Possessing instant eye appeal—with all the Roper features available—this new creation will build real replacement sales volume for you.

. . . . Write or Wire for Your Sample Range Today!

GEO. D. ROPER CORPORATION, Rockford, Illinois

Consider These Three Basic Principles in Water Heating

In measuring the economy and capacity of any Automatic storage system consider these three basic principles in Water Heater design.

FIRST — **Heat the entire tank from top to bottom while heating.**

SECOND — **Insulate the tank while standing.**

THIRD — **Stratify the water while drawing.**

The Kompak design meets these three requirements in every detail. The coil under the tank heats it from top to bottom while heating.

No products of combustion touch the tank, which is insulated against heat loss while standing; hot water circulator from coil being immersed in the tank, prevents reverse circulation.

With hot water leading to top of tank while drawing, there is always complete stratificating in the tank and all heated water is always available at the faucet. Besides the Kompak is made of everlasting Copper and has the original and only Automatic pilot, the only fuse plug shut off.

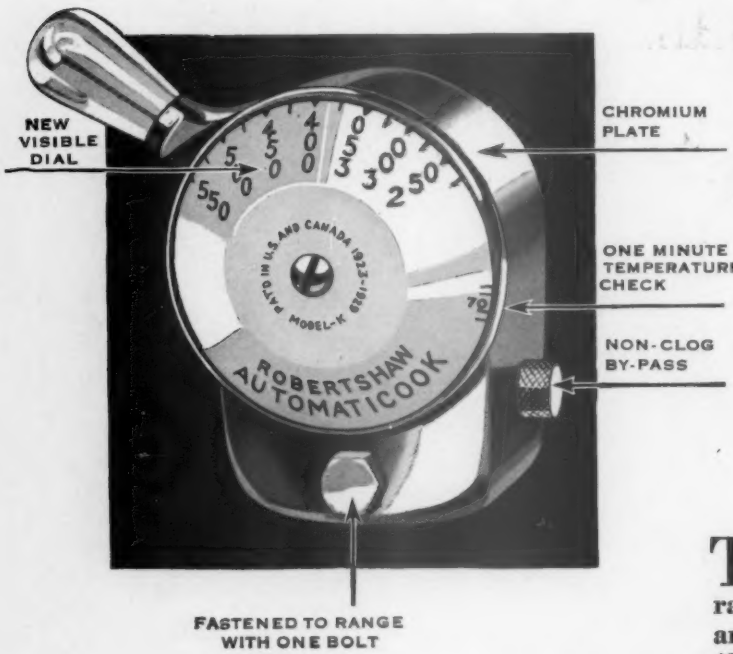
Gas Companies who wish to build a permanent water heater load, should consider these basic principles.

THE KOMPAK COMPANY,

New Brunswick, N. J.

KOMPAK
TRADE MARK
REG.

Here it is!
The New Improved
"K" Type
AutomatiCook
with 5
great Features



THE NEW "K" type AutomatiCook has five great features to make gas range selling easier for you. Here they are: (1) Handsome chromium plate finish. (2) Fully visible dial. (3) Fool-proof One-Minute Temperature Check. (4) Non-Clog by-pass. (5) Only *one* bolt attachment to range.

The new AutomatiCook is smaller, more handsome, more compact. It's better looking. There's a One-Minute Temperature Check. Every working part is accessible from outside of range.

More than 100 makes of the new ranges will be AutomatiCook equipped this year. Learn all about this greatly improved heat control now. Write for full descriptive literature . . . *today!* It might result in your selling more ranges this season.

ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Penna.

It Is a GOOD Gas Range That Has This RED WHEEL

Another NEW MAGIC CHEF

MODEL AT AN ATTRACTIVE LOW PRICE . . . .

TO REACH a vastly wider market American Stove Company announces another new Magic Chef . . . the Doric Model . . . to retail at the low price of $74.75.

• This charming new Magic Chef, Grecian in design, is porcelain enameled in Old Ivory finish with green crackled enamel trim. Handles are of ebonized bakelite mounted on escutcheons of the same trim. Linings are also porcelain enameled. Insulation is optional at extra charge.

• Like all Magic Chef models, the Doric has the well known Red Wheel Oven Heat Regulator found only on American Stove Company products.

• The Doric is only slightly smaller than the Tiffin Model and will fit into more limited space, yet has ample cooking capacity for ten people.

• With its outstanding quality, beauty and remarkable price appeal, this new Magic Chef will meet with enthusiastic sales response.

• For full details write American Stove Co., Dept. C, 801 Chouteau Avenue, St. Louis, Mo.

Magic Chef

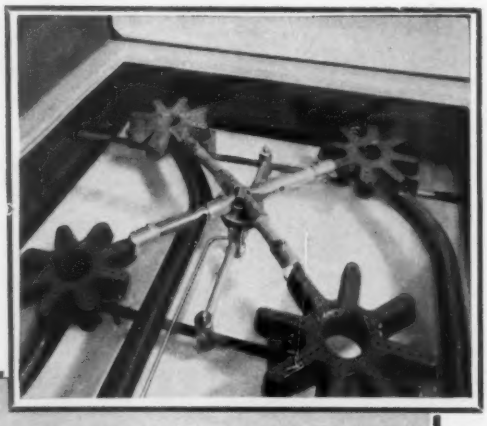
AMERICAN STOVE COMPANY

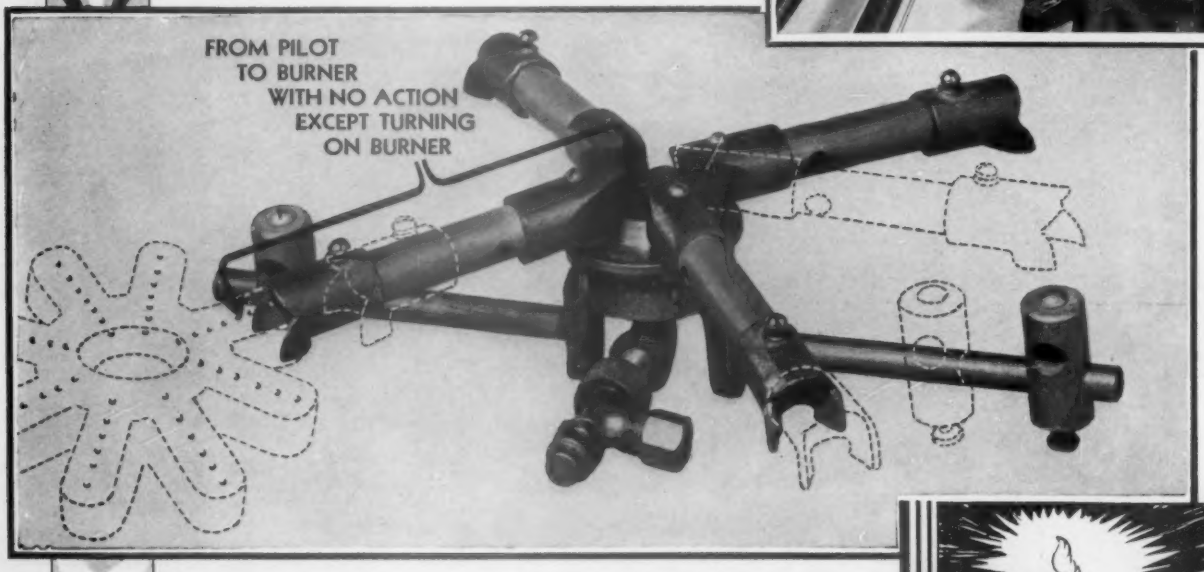
World's Largest Manufacturer of Gas Ranges

NEW YORK PHILADELPHIA ATLANTA CLEVELAND
CHICAGO ST. LOUIS SAN FRANCISCO LOS ANGELES

"PATROL-FLASH" LIGHTER

FOR TOP BURNERS ONLY AT A PRICE MEETING POPULAR DEMAND





Since the dawn of time there have been other lighting methods, but only the flash-back principle used by "Patrol-Flash" gives true automatic gas range lighting.

Merely turn on the gas. "Patrol-Flash" lights the burner automatically and positively. No buttons to press. No other valves to open. Just turn on the gas with one hand and the burner flashes aflame instantly.

"Patrol-Flash" top burner lighter only may be readily installed on any stove using round rod burner supports. Adjustable features of "Patrol-Flash" allow the tubes to be swung through a 1½" arc and an extension in length of ½". The height of the new lighter may be also varied to meet the depth of various burners and their supports.

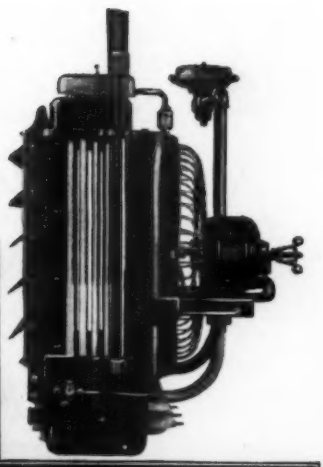
Lips on the burner ends of the tubes insure accurate alignment of each tube for most efficient ignition. The customary lighter tapping in the manifold is used for the pilot line furnished with "Patrol-Flash."

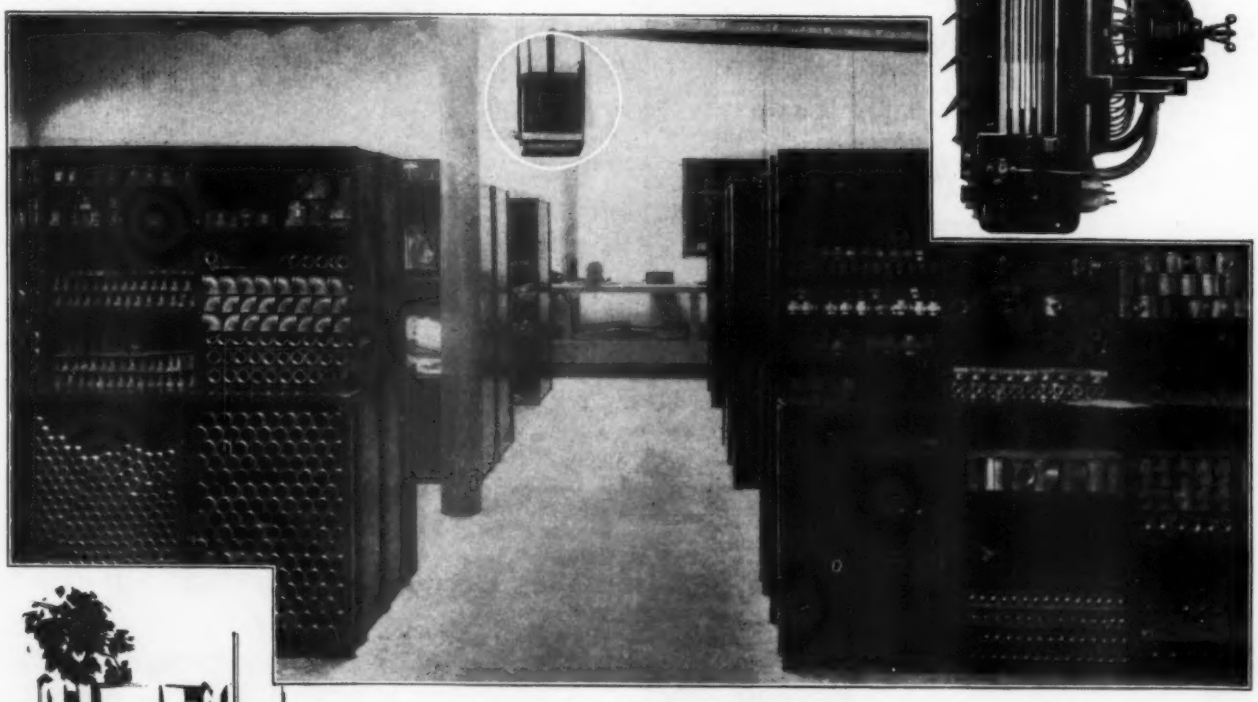
A word will bring detailed literature.

THE PATROL VALVE COMPANY, *Cor. Locust Ave. and W. 114th St.*

CLEVELAND, OHIO

Profitable Insurance
Against Cold, Rust and Corrosion





Stock room of the Public Service Electric & Gas Company of Englewood, New Jersey

Stock rooms are the key sources of supply for efficient servicing and manufacturing. They must be neat and orderly, making parts and materials instantly available. Humphrey Gas Unit Heaters are installed to insure instant heat where loading doors are constantly being opened admitting cold air. The circulation of heated air prevents rusting and warping of materials. Humphrey Gas Unit Heaters are suspended from the ceiling leaving valuable floor space available for stock and materials. Because they burn gas, they provide instantaneous heat and are automatic in operation when thermostatically controlled, insuring a constant temperature and comfort for the workmen. Humphrey Gas Unit Heaters are a valuable asset to any stock room, protecting materials against cold and corrosion. Another new and fertile field for the Humphrey dealer.

A HUMPHREY PRODUCT MADE BY

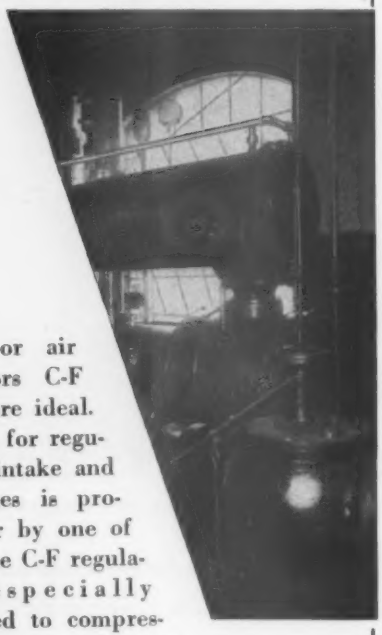
GENERAL GAS LIGHT COMPANY, KALAMAZOO, MICHIGAN

NEW YORK SAN FRANCISCO PITTSBURGH CLEVELAND

The Humphrey Gas UNIT HEATER

C-F Regulators for Compressors

. . give dependable regulation of suction and discharge pressure



FOR gas or air compressors C-F Regulators are ideal. Every need for regulation on intake and outlet lines is provided for by one of the three C-F regulators especially adapted to compressor service. The C-F regulators used with compressors are:

(1) **C-F Compressor Regulator for constant speed pumps to relieve excess pressure at the discharge.**

(2) **C-F Throttling or Unloaded Regulator for maintaining a constant pressure at discharge under varying load conditions.**

(3) **C-F Vacuum Regulator (two types) for safeguarding against dangerous vacuums.**

Write for descriptive literature.

The Chaplin-Fulton Mfg. Co.

28-40 Penn Avenue Pittsburgh, Pa.

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Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 108.

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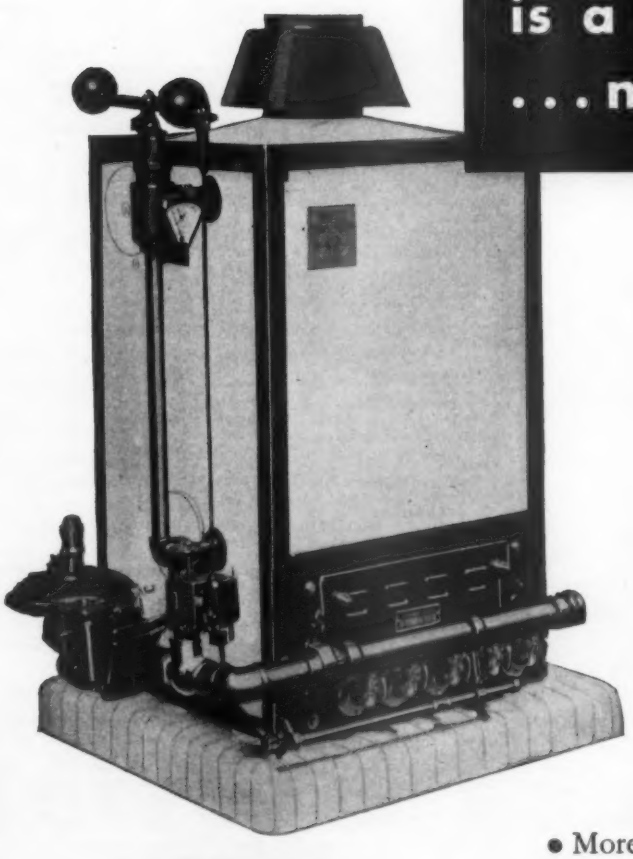
100% Automatic Heat is a real Investment ...not a Luxury



IDEAL GAS BOILERS

★ The last word in automatic heating — Ideal Gas Boilers carry all the prestige of American Radiator Company—a fact that appeals instantly to every prospect.

• More than 600 million dollars has just been distributed by Christmas Clubs. Much of that money will be spent this month and next. And a large proportion of it will be invested in products that are real investments—not just luxuries.

• Ideal Gas Boilers are not luxuries. They are real investments in warmth, comfort, convenience and increased home value.

• So start now to get your share of Ideal Gas Boiler profits. We'll be glad to furnish you with free merchandising helps. Remember, if this is the time to buy—it is also the time to sell.

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AMERICAN RADIATOR COMPANY

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Gas Plants
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use the
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REFRACTORY GUN
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The QUIGLEY GUN shoots a plastic, refractory mixture directly to any desired place, even when retorts or ovens are hot.

It makes the material stick where hand-troweled or rammed-in applications might fail to hold.

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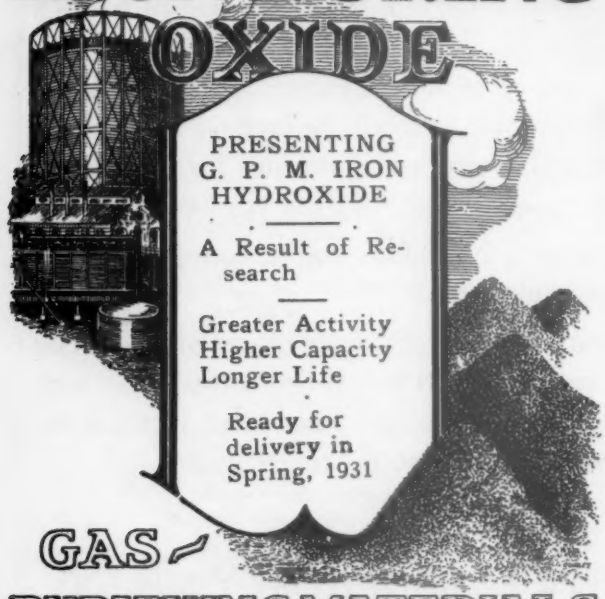
ACID PROOF CEMENTS ACID AND ALKALI PROOF COATINGS

Stock and Service through Agents in Every Industrial Center

IRON BORING OXIDE



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G. P. M. IRON
HYDROXIDE

A Result of Research

Greater Activity
Higher Capacity
Longer Life

Ready for delivery in Spring, 1931

GAS PURIFYING MATERIALS COMPANY INC.

FOOT OF HALSEY STREET - - - - LONG ISLAND CITY
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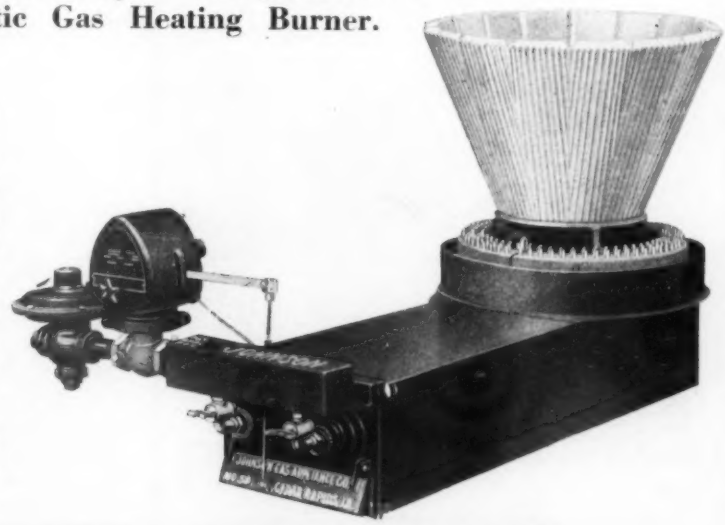
IT'S READY

A complete story on the Johnson Automatic Gas Heating Burner.

**(Excerpt from first paragraph of new brochure)*

*** The advent of gas home heating has created a demand for a dependable, economical and automatic gas-burning unit, easily adaptable to various size furnaces originally built for other fuels. The Johnson Automatic Gas Heating Burner is dependable, because it has been built well; it is economical because it has been properly designed; and it is as safe as modern science and expert engineers can make it.**
Fifteen more pages tell you the complete story of this great advance in gas home heating equipment. Write for this new brochure.

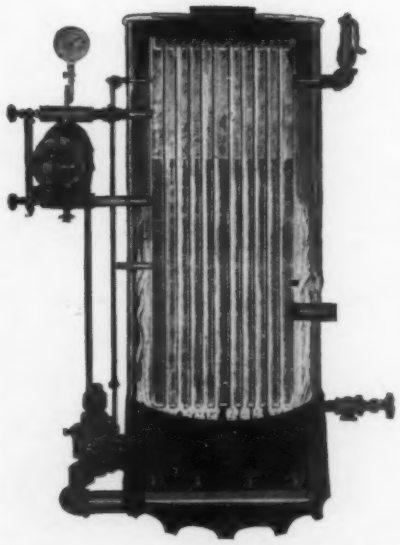


JOHNSON GAS APPLIANCE CO.
Cedar Rapids JOHNSON PATENTED DIRECT JET **IOWA**

Increase Your Gas Load

In the Processing Industries!

[KANE Boilers point the Way]



Sectional view of 10 Hp. Standard KANE Boiler, equipped with Low Water Gas Cut-off, and Model 30 Automatic Gas Supply Control.

—by "process industries" is meant *any* industrial unit using steam for processes—thus your prospects for KANE boilers range from Bake Shops to Chemical Plants . . .

KANE automatic gas boilers, made by pioneers in automatic gas-boiler control, point the way to an increased industrial load, with complete consumer satisfaction. Kane boilers are compact, requiring little installation space and no long pipe lines; steam delivered is *always* clean, steady, abundant,—unvarying in either temperature or pressure. This means *consistent* steam processing for your customer, the invariable result with an independent gas-fired process steam boiler such as the KANE. *Write for Bulletins and Catalog Units.*

MEARS-KANE-OFELDT INC.

1903-1915 EAST HAGERT ST., PHILADELPHIA

New York—9 Park Place
Boston—100 Arlington St.
Chicago—325 W. Huron St.
Buffalo—Waldridge Bldg.
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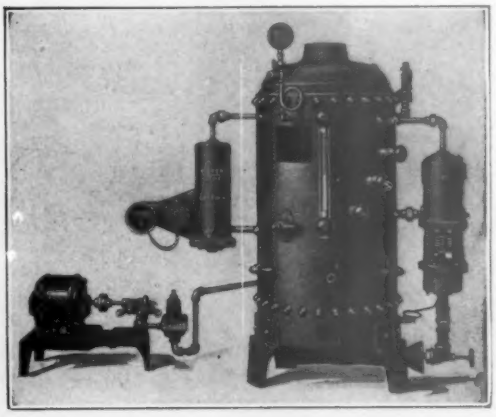
Makers of Automatic Gas Boilers for over a Quarter Century

Automatic Gas Fired Boilers

Electric Water Feed Systems



All Pressures
½ to 30 Horsepower

P. M. LATTNER MFG. CO.
Cedar Rapids, Iowa

GROBLE REGULATORS & GOVERNORS

Complete line of Regulators for

NATURAL
MANUFACTURED
BUTANE
PROPANE
GASES

HANDY INDICATOR for determining correct orifice size of service regulators according to inlet pressure mailed upon request.

GROBLE GAS REGULATOR COMPANY
***Office and Factory*—Anderson, Indiana**

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(*Continued from page 102*)

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Partlow Corpn. 474

METER HANGER CATALOG
Mueller Co. 2

PERFORMANCE IS PROOF
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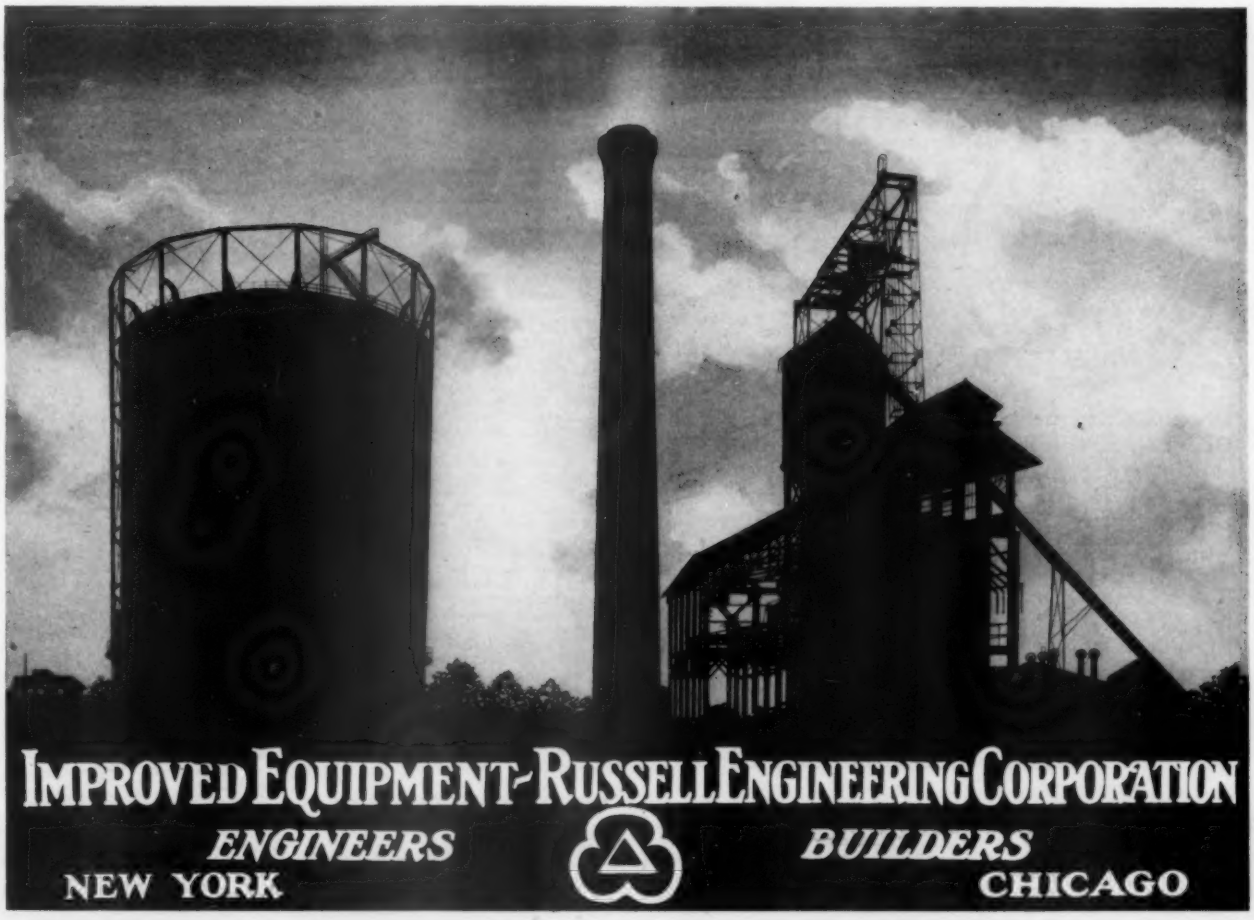

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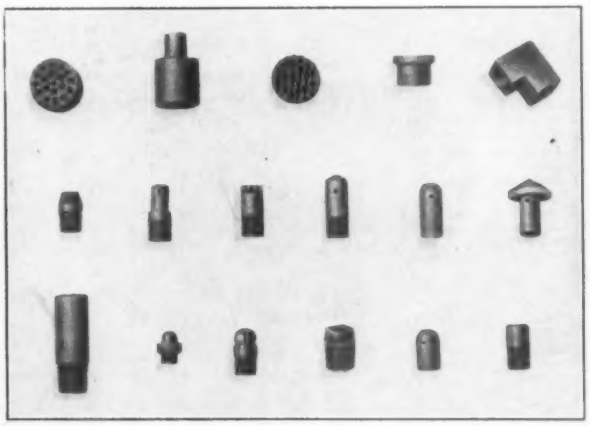

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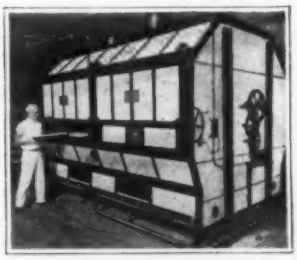

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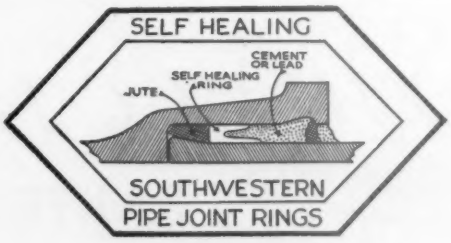

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